Vol. 133, No. 3 September, 1930 Price 25c

AMERICAN GAS JOURNAL

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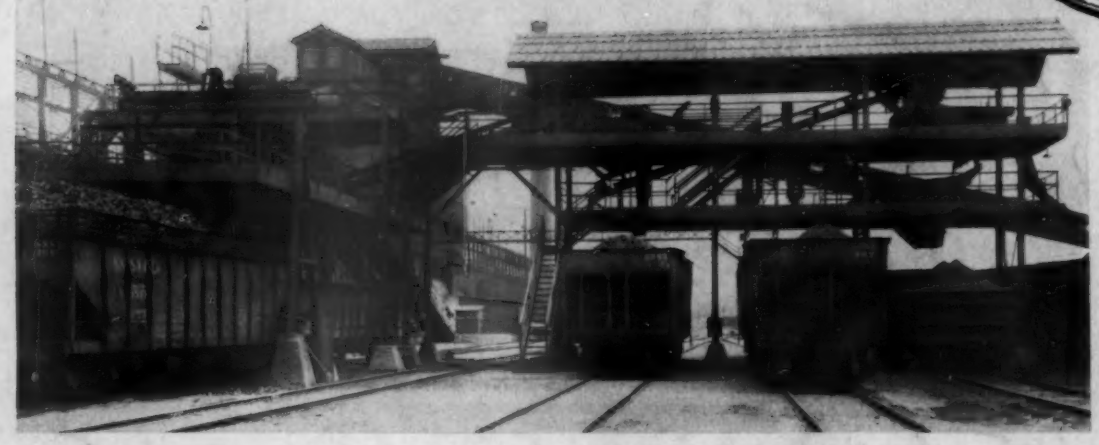

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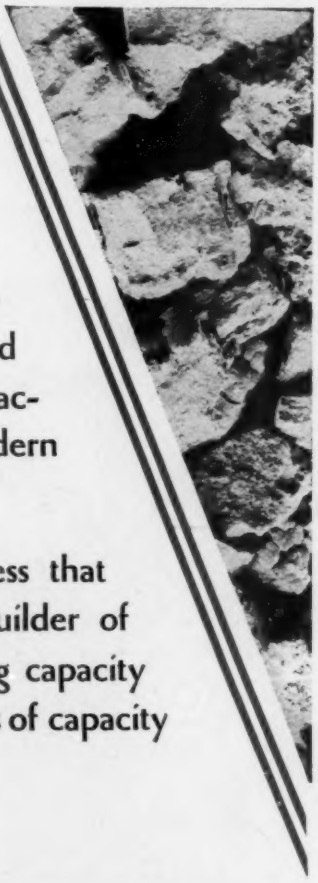

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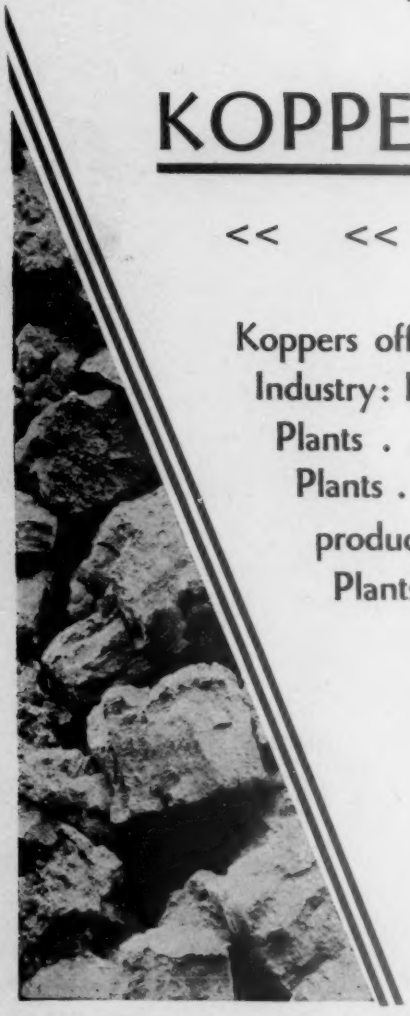

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Vol. 133, No. 3 September 1930 Whole Number 3681

TABLE OF CONTENTS

Aiding Prosperity's Return 33
Who Goes to Atlantic City—and Why?.. 34
Appliance Profits Evaporate in High Service Costs 34
The Melancholy Days 34
A Little Touch of Service 35
The Engineer Turns Merchandisingward 35
Coke Oven Operation and Maintenance—F. J. Pfluke 37
Rubber Protection for Equipment in the Gas Plant—H. E. Fritz..... 42
The Gas Producer—John W. Romig.... 44
Some Observations On Japanning and Enameling—William J. Miskella..... 46
Gas Fired Boiler for Asphalt Handling—J. B. Nealey 49
Year 'Round Comfort—Special Correspondent 51
American Gas Association Issues Important Treatise On Bread Baking..... 53
The Design and Capacities of Bleeders.. 54
Removal of Impurities from Natural Gas 56
Air Filters On Gas Engine Intakes..... 58
Heat Dissipation From Dry Exhaust Lines 59
Gas Utilization Technology for The Domestic Salesman—A. M. Apmann..... 62
Merchandising Views and Reviews..... 69
How Come!—Hylan Piper..... 72
Gas Sales Statistics—Paul J. Imse..... 73
Greatly Increases Sales—John H. Hartog 75
Equipment News 76
News of the Gas Industry..... 78
Personals 86
Trade News 90

INDEX TO ADVERTISERS PAGE 123

AMERICAN GAS JOURNAL, September, 1930, Vol. 133, No. 3 Published monthly by American Gas Journal, Inc., at 34 Crystal St., East Stroudsburg, Pa. Executive, Editorial, and Business offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 17, 1928, at the postoffice of East Stroudsburg, Pa., under the Act of March 3, 1879.

Subscriptions $2.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines; in Canada $3.00; foreign $4.00. Single copies 25 cents.

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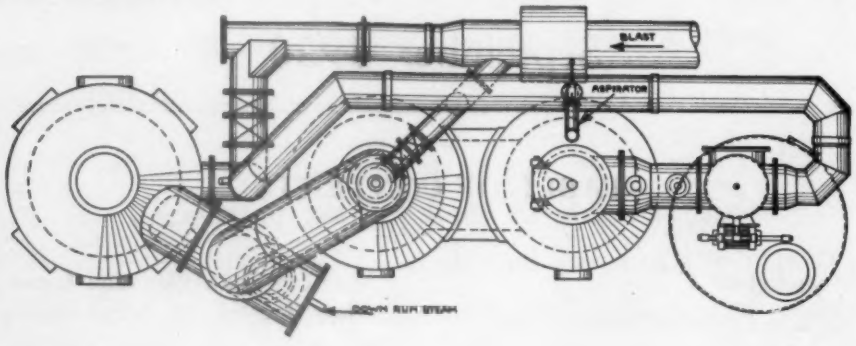

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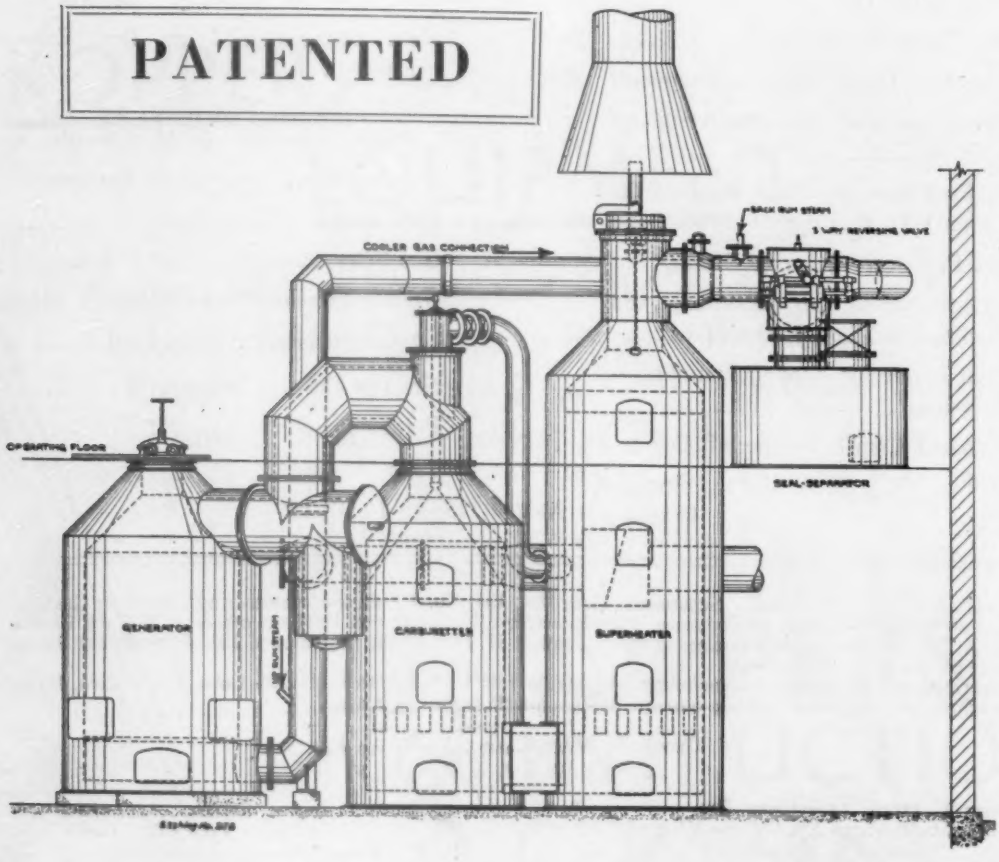

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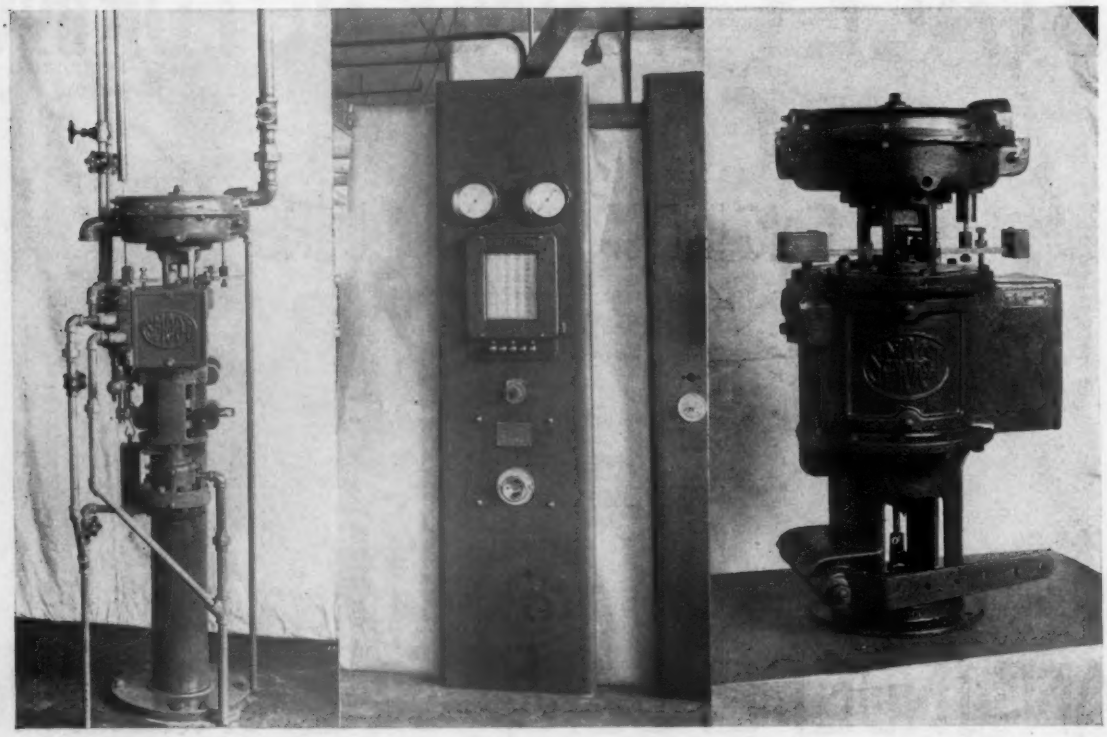

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		Coke Oven	550		
2	1	Blast Furnace	90-110	250	1,708,000
		Coke Oven	550		
3	2	Blast Furnace	90-110	200	1,000,000
		Coke Oven	550		
4	9	Blast Furnace	90-110	150-250	400,000-800,000
		Coke Oven	550		
5	1	Oil Gas	500	550	800,000
		Natural Gas	1,000		
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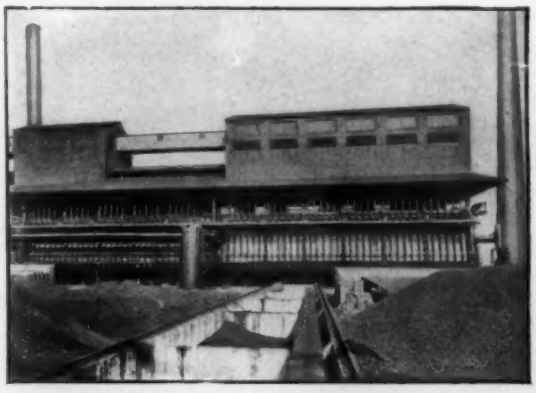

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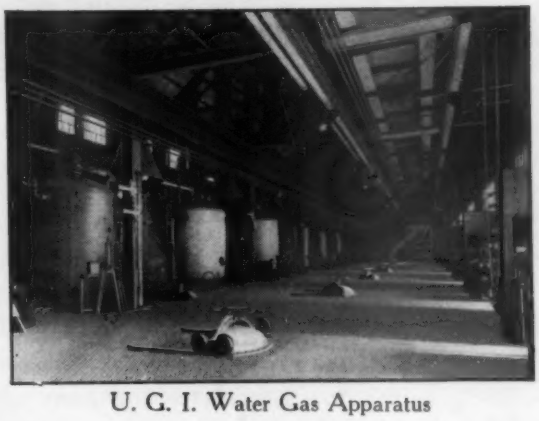

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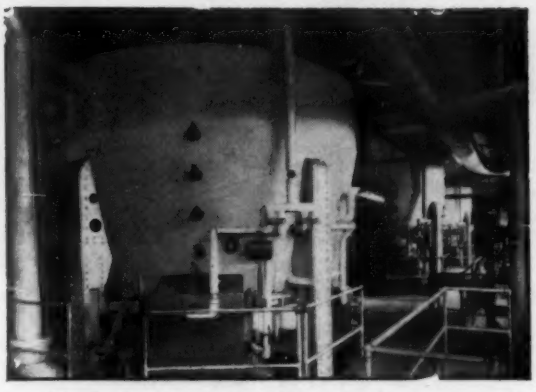

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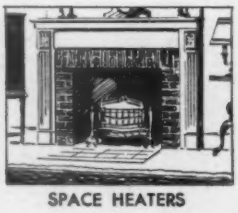

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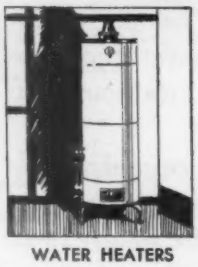

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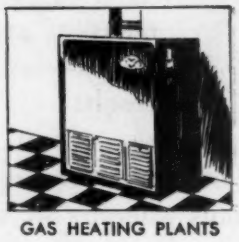

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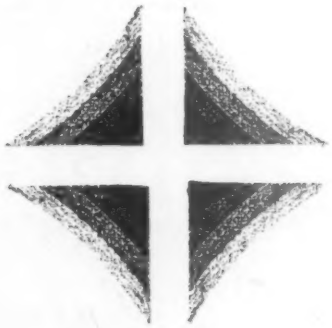

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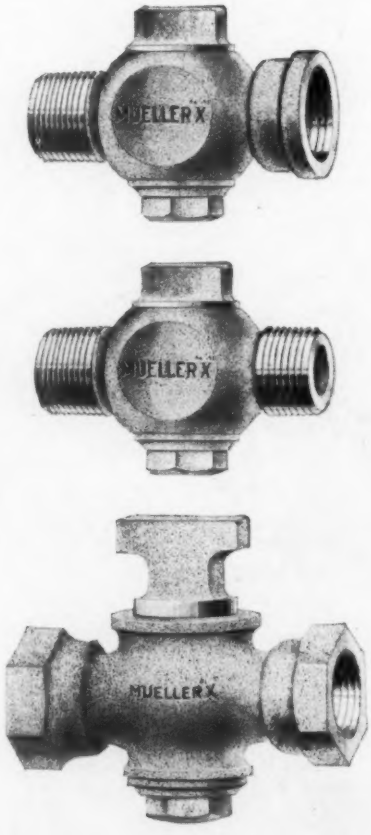

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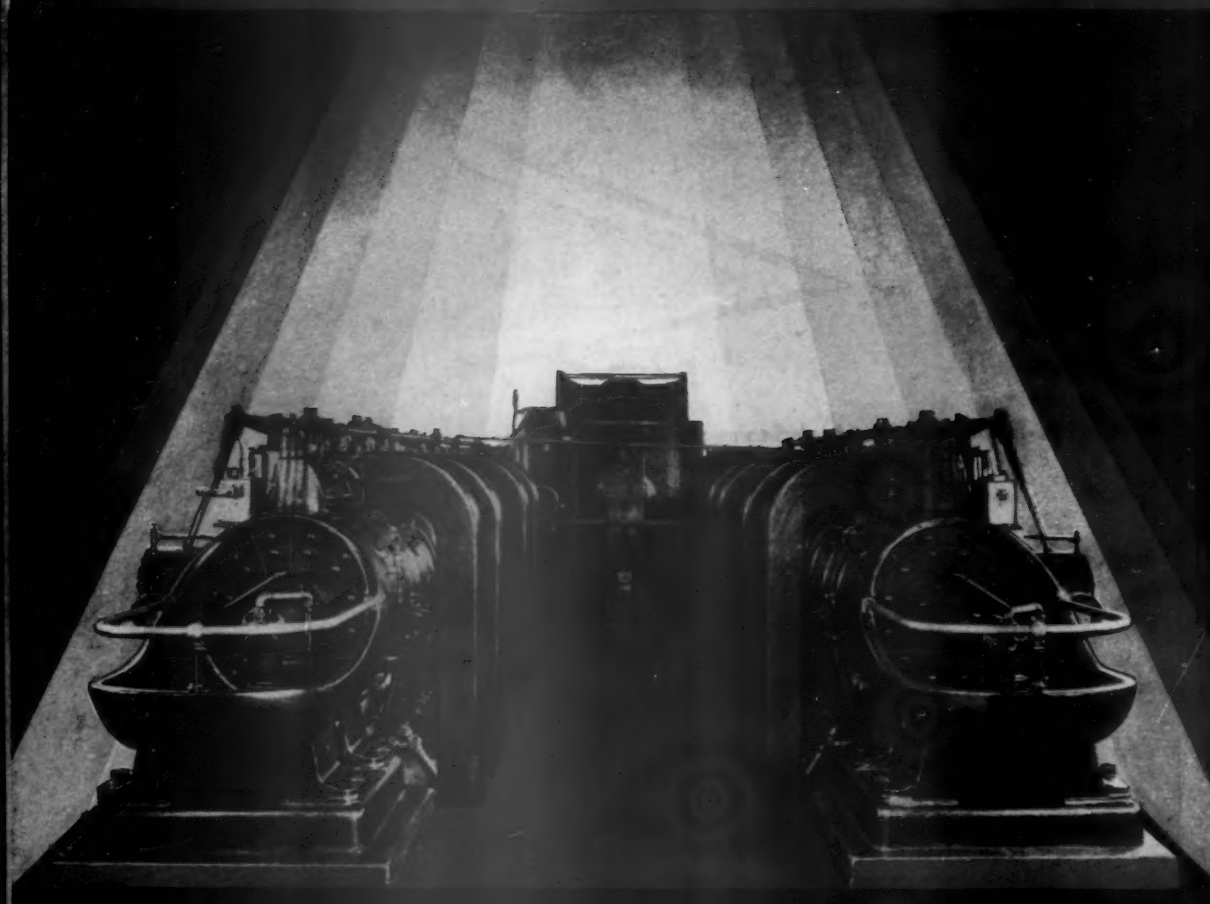

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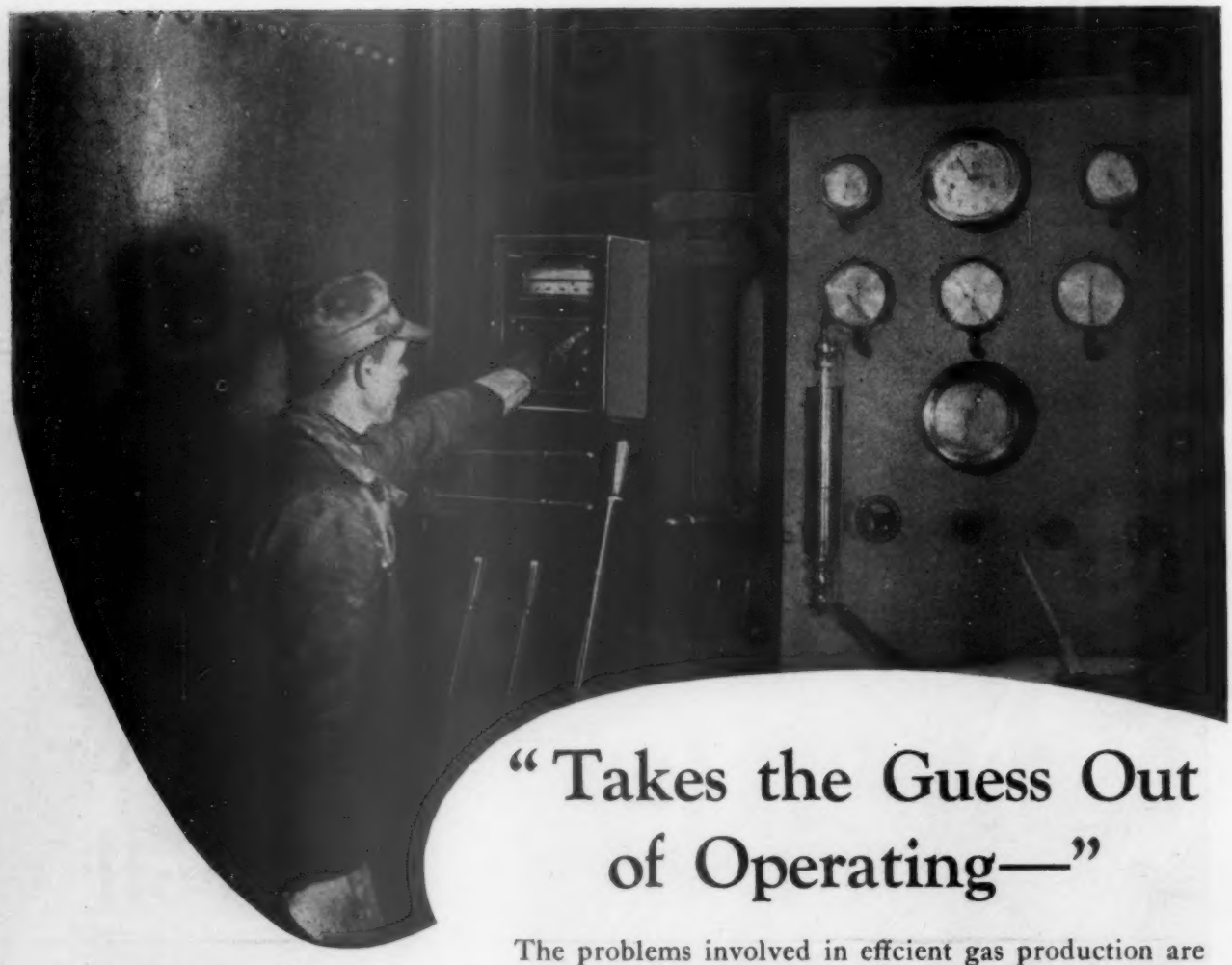

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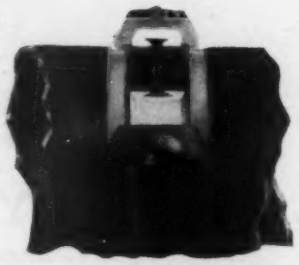

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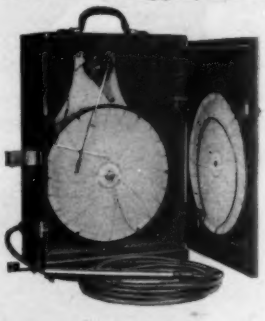
Range 0-250°F. recommended for checking water temperatures, etc.

Range 0-1000°F. recommended for checking oven temperatures, stack temperatures, etc.



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Branch Offices:

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BRISTOL'S
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OVER 54 YEARS

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1876-1930

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Nearly half a century ago Connelly developed the well known Iron Sponge. A newer product called Iron Sponge Precipitate has since been invented and a modern plant has been equipped to produce it.

Connelly Back Pressure Valve

OTHER PRODUCTS

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Jones Jet Photometer
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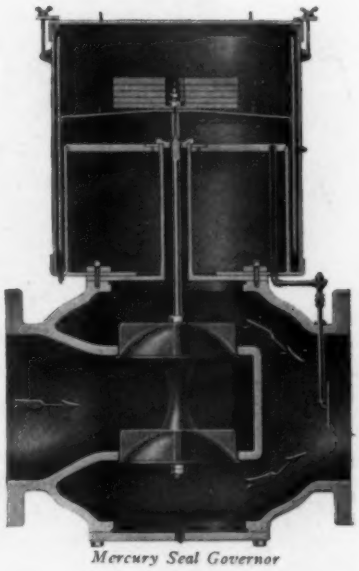

Mercury Seal Governor

GOVERNORS

CONNELLY IRON SPONGE & GOVERNOR COMPANY

MAIN OFFICE and PLANT: ELIZABETH, N. J.
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BIG CLAIMS

and unusual performance

You may think our claims extraordinary. You may feel that a grain of salt is essential. But we sincerely ask you to try the cements we recommend—try them with the assurance of our unusual guarantee!

Whether you operate a coal gas plant, a water gas plant or a coke oven plant, you'll find that one of the cements listed below will comply exactly with the service you require. You will find that R & E Refractory Cements are the best you've ever used—not because we say so but because they actually prove it in many plants.

Our Guarantee

You cannot tell 'till you try. You cannot even imagine how many extra hours of service R & E Cements will give until you prove them in your plant. And when we guarantee longer service, guarantee your satisfaction and lower final costs, how can you miss the opportunity?

For Water Gas Plants

For Coke Oven Plants

Send for a trial order, it will cost you nothing if you are not satisfied.

REFRACTORY & ENGINEERING CORPORATION

Engineering and Manufacturing Specialists in High Temperature Cements

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Warehouses in

Boston Pittsburgh Baltimore Philadelphia Chicago Norfolk

R & E No. 3000

You can't find a better cement for all-around service in gas plants. R & E No. 3000 air-sets to full strength; always retains its bond, makes brick dislodgement impossible when "barring down," will not crumble. Unusual adhesiveness makes No. 3000 extremely efficient for hot or cold patching. Fine texture permits extremely thin joints which, together with its excellent bond, is a further safeguard against bricks "pulling out."

No. 3000 will not bloat or puff at low temperatures; does not crumble or fall when equipment is "off the line." Withstands temperatures in excess of 3000° F.
Conveniently shipped ready for use in plastic form in 500 and 100 lb. steel drums. Try a drum today.

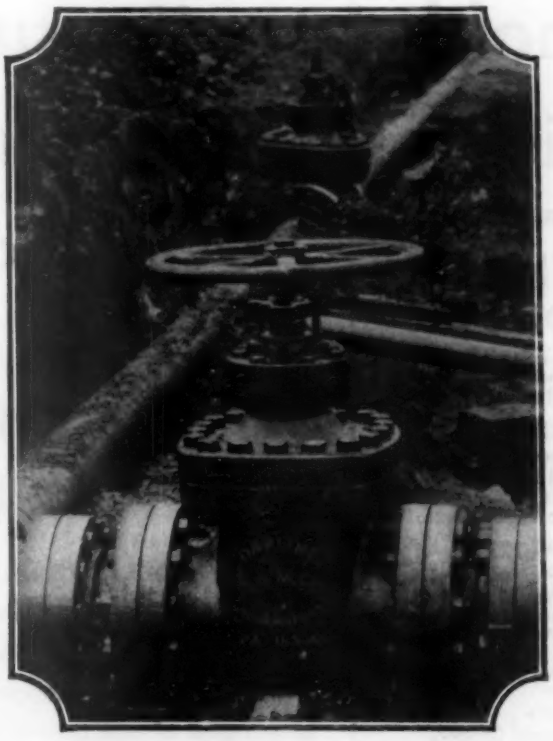
"MOLDIT"

We recommend Moldit for such work as monolithic floors, checker work and arches. It avoids delays in waiting for special tiles or brick. Just add a little fresh water and mold it into any desired shape.
Moldit "air-sets" and attains full strength without heat. It does not shrink and meets the most severe requirements of modern construction. You can use Moldit under temperatures up to 3000° F. It's easy to use, too. Add a little fresh water and pour—no ramming, no hammering—just mold it. Weighs only 100 lbs. molded. Shipped in convenient 100 lb. waterproof bags.

"Moldit-A"

Use Moldit-A for service under temperatures between 300° F. and 2400° F. It works the same as "Moldit" and can be used for monolithic floors, standpipes, doors, etc., any place where great structural strength is essential, or desired.
Like other R & E Cements, Moldit-A air-sets and gains full strength without heat. It weighs approximately 100 lbs. per cubic foot and is shipped in 100 lb. handy waterproof bags.
Order a few bags on trial today.

R & E REFRACTORY CEMENTS



Easy to Operate —but Always Tight

If a valve operates with difficulty, permitting a small volume of gas to pass through, it means expense in repairs and delay in getting into production, loss of gas and wages paid for unproductive work.

Darling Gate Valves cover all the points required for a perfect valve, regardless of the severity of service. They last for years—they seldom need repairing or replacing. And in spite of their ease of operation, they always stay tight.

The tests we insist upon giving *all* Darling Gate Valves, regardless of type or size, before they leave our factory, are far more severe than the service they will meet. *Every* Darling Gate Valve is tested at its rated pressure and held under this test pressure until inspection is completed. It is our assurance of their uniform high quality.

Construction details will be gladly sent to those interested.

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DARLING VALVE & MFG. CO.

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DARLING GATE VALVES

Reynolds Low Pressure Service and Appliance Regulators

Designed and Built for »

1. ACCURACY
2. EFFICIENCY
3. DURABILITY

REYNOLDS PRODUCTS

for all kinds of Pressure Reductions » » for either artificial or natural gas.

GOVERNORS » »
- Intermediate Pressure
- Triplet Outlet
- Holder
- Toggle Type Street

REGULATORS » »
- High Pressure Service
- Low Pressure Sevice
- Intermediate Pressure
- High Pressure Line
- Single and Double District Station

VALVE » »
- Automatic Quick-Closing Anti-Vacuum

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» Install REYNOLDS Units and do away with your Gas Control worries. They have the usual Reynolds characteristics—operating simplicity—absolute dependability. These Low Pressure Regulators operating on an inlet pressure of one pound or less will work from one-half inch to six inches outlet pressure.

Reynolds Gas Regulator Company
Anderson, Indiana

Reynolds Branch Office, Room 422 Dwight Bldg., Kansas City, Mo.

REPRESENTATIVES

EASTERN SERVICE CO. Boston, Mass.
F. E. NEWBERRY Avon, N. J.
THOS. C. CORIN Detroit, Mich.

GAS CONTROL SINCE 1892

A coal contract is no stronger, and the protection it affords the consumer is no greater, than the strength and integrity of the producing company.

BOONE-CHILTON

Performance

Years of satisfactory contract fulfillment should be a safe guide to the future. The Boone County Coal Corporation protects the coal supply of its gas customers by a reliable performance of its contracts.

Safeguard your coal supply by a contract for

WATER-GAS
COAL-GAS
BY-PRODUCT

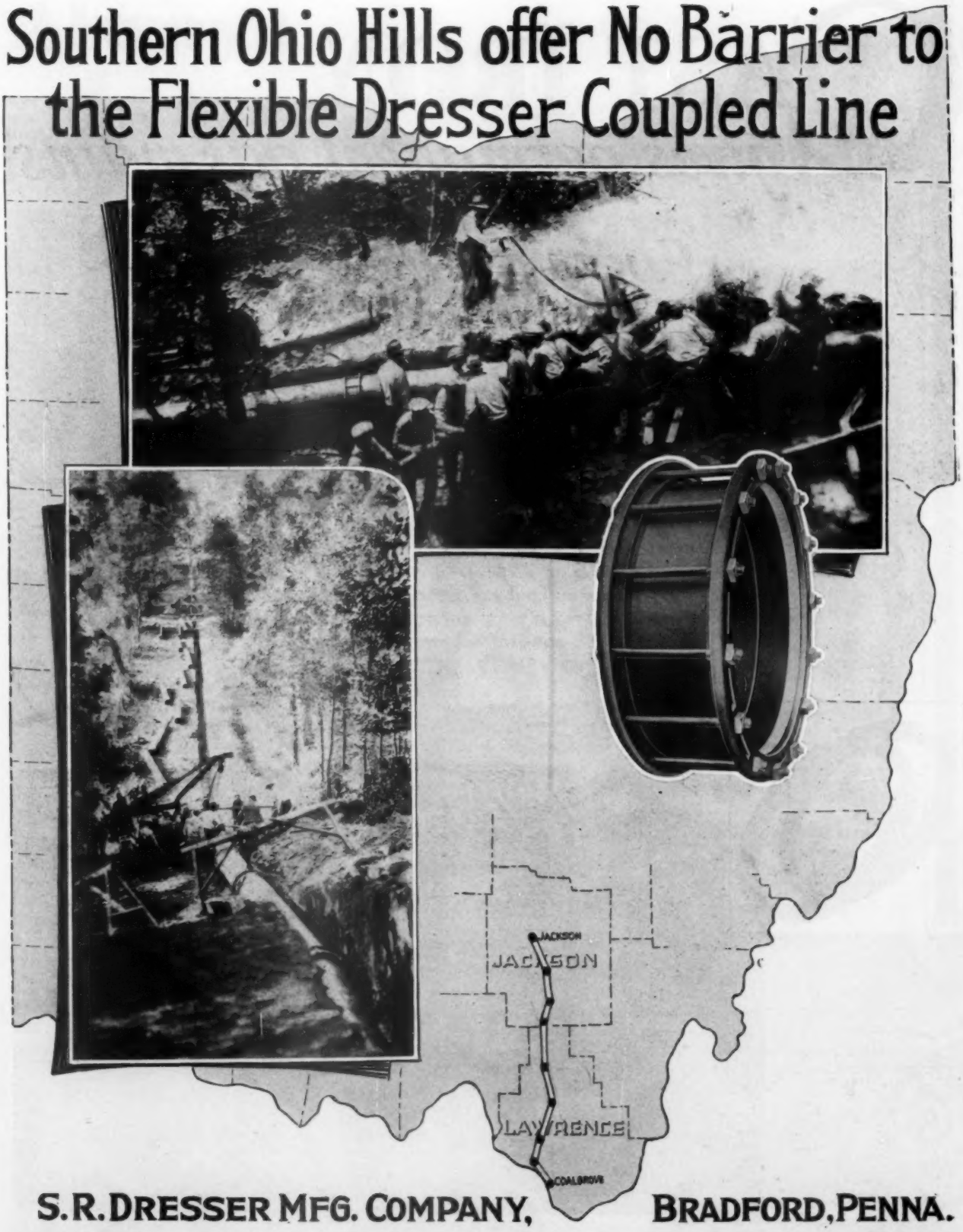
Produced and Sold by
the BOONE COUNTY
COAL CORPORATION

BOONE-CHILTON

GAS COALS

BOONE COUNTY COAL CORP-PHILADELPHIA-CHICAGO

Southern Ohio Hills offer No Barrier to the Flexible Dresser Coupled Line



S. R. DRESSER MFG. COMPANY, BRADFORD, PENNA.

DRESSER COUPLINGS DOMINATE

CAST IRON *gives permanent gas mains and* RUBBER RINGS *make tight joints..*

Gas distribution engineers everywhere are enthusiastic over the combination of cast iron pipe and rubber ring, bell-and-spigot joints. In one form or another, this type of construction has been very satisfactory for modern gas distribution systems.

Clow-National gas pipe is adapted for rubber ring joints of several kinds. In addition to standard gas pipe in lengths of 12, 16 or 18 feet, Clow-National makes a complete line of A.G.A. standard gas fittings. Cast iron pipe and rubber ring joints gives a permanent gas main that can be had no other way. No coating is required to prevent rust. It is trouble proof.

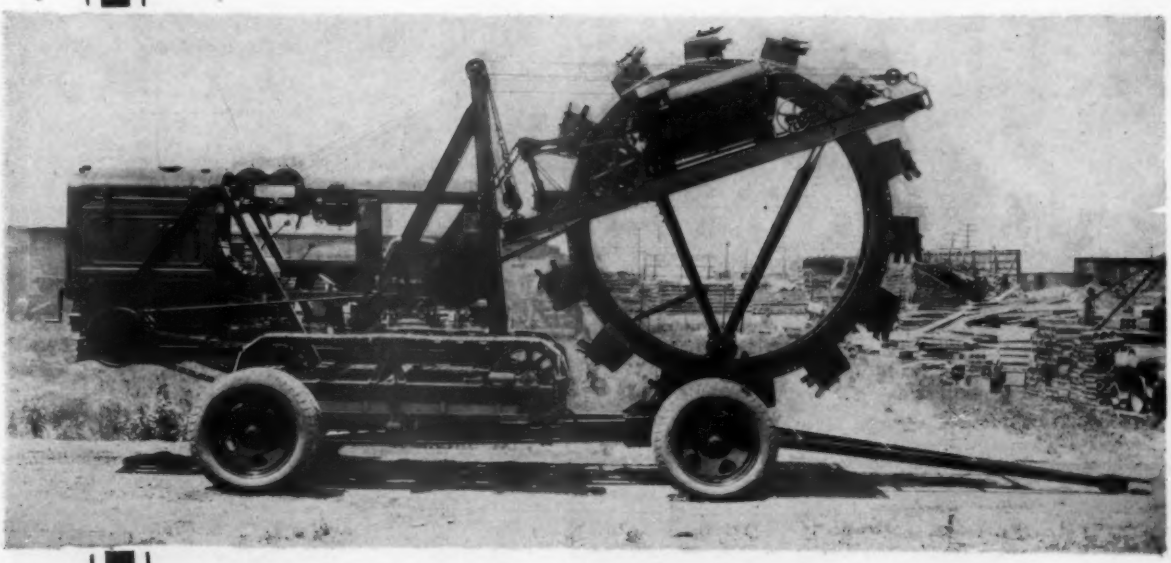
James B. Clow & Sons
Chicago, Illinois

National Cast Iron Pipe Co.
Birmingham, Alabama

Top: The Southwestern type rubber ring for gas pipe joints. Right: Uncovering old, but still good, cast iron pipe in excavating for the subway on Broad Street, Philadelphia.

CLOW-NATIONAL
CAST IRON PIPE
"Everything for a Pipe System"

Always a 100% Trencher



Today's Baby Digger—

TEN years of successful performance have seen no change in the general design of the Baby Digger, the pioneer small trencher. Time has proved it fundamentally correct. Cleveland Baby Diggers have *always* had built into them the requisites for efficient performance—economy—wide usefulness—super quality—and correct design. Today, even more than in the past years, the Cleveland Baby Digger is the indicated method of digging gas trench.

Compact to the "nth" degree (only 58 inches in overall width) it supplants hand labor in the most congested districts. Without excess tonnage (approximate weight 4 tons) it has unrivalled transportability. And in addition astonishing ruggedness, power and digging speed have been built into today's Baby Digger.

It's a 100% trencher because of strict adherence to one policy—to build to the most practical specifications a machine of the finest materials and construction, without regard to cost.

Original Baby Digger

THE CLEVELAND TRENCHER COMPANY

"Pioneers of the Small Trencher"

20100 St. Clair Ave.

Cleveland, Ohio

Visit Us at Booths Number 324-325 A. G. A. Convention, Atlantic City, October 13-17

The CLEVELAND BABY DIGGER

Over the top!
—TO ELIMINATE washouts

and cut down maintenance

LET old Bird Creek overflow whenever it will! Its raging torrents can never harm the two pipe lines on this 340-foot span, four feet above high water mark. Two well designed 12-inch bends on the right bank convey natural gas from the underground lines to the suspension bridge level. These bends also serve as expansion units.

Cities Service Gas Company took this unusual means to insure uninterrupted service and freedom from high maintenance costs at their Tallant, Oklahoma crossing. While they were anxious to obtain a neat appearing job on account of the nearby highway, their first concern was a successful engineering venture.

For this reason they chose pipe with a high rating for strength, ductility, uniformity and particular fitness for constructions as unusual as this. They said, NATIONAL—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY PITTSBURGH, PA.
Subsidiary of United States Steel Corporation

NATIONAL PIPE

No. 2 and No. 3 SPRAGUE METERS

for

House Heating Jobs

Accurate Pilot Measurement
Accurate Volume Measurement

Satisfactory
Maintenance cost, first cost, and general results in Manufactured or Natural Gases, High or Low Pressure

Get Ready Now For the Fall Rush

SPRAGUE METER CO.
BRIDGEPORT, CONN.

When Nights Get Nippy
and Frost Lingers in the Morning Air
When Nights get Nippy and Frost lingers in the Morning Air
Available Now!
ANOTHER
Outstanding Campaign to help sell Gas . . . and JANITROL
It contains merchandising helps and suggestions well worth the consideration of any Gas Company Executive interested in increasing the domestic load by pushing the sale and use of conversion burners.
This New Fall Janitrol Campaign sponsors the thought of HEATING WITH GAS "When Nights Get Nippy and Frost Lingers in the Morning Air."
Fall brings crisp nights . . . snappy mornings . . . autumn moons . . . house warmings . . . football—the mental processes of people turn to house heating. Now is the time to dovetail the selling of Gas . . . and JANITROL, with those thoughts fast becoming uppermost in the minds of Gas Company patrons. Why not encourage them to use Gas next winter through such appeals?
Also, there are miscellaneous appeals, i. e., "Tracks—all over the house; "10 Seconds"—to start the fire that lasts all winter; "Modernize with Gas"—the vogue in house heating, and others . . . all to turn your prospects' minds to greater use of Gas.
The New Fall Janitrol Campaign is made up in a convenient portfolio size. Order your copy today.
THE SURFACE COMBUSTION CO.
Incorporated
TOLEDO, OHIO
Wedding Bells and Coal Shovels
Pardon Girls THE FIRE'S LOW
New Freedom
10 Seconds
Modernize with Gas
Tracks... ...Tracks from attic to basement
When Nights Get Nippy
Janitrol

IN BOSTON . . . original cast iron water mains are still in service after 83 Years . . . . .

Fairchild Aerial Survey, Inc., N. Y.

CAST iron water mains which were put down way back in 1847 are still on duty in the City of Boston. A splendid record, and convincing, but by no means exceptional for cast iron pipe. Many cities in all parts of the country can point to cast iron mains still in use after as long, or even longer, service.

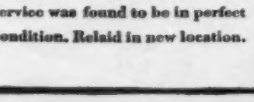
The superior durability of cast iron pipe is due to its high resistance to rust and corrosion. Gas and water mains of ferrous metal (iron and steel) with the exception of cast iron, disintegrate from rust. Cast iron pipe is the only ferrous metal pipe practicable for underground mains which rust will not destroy.

Engineers, contractors and city officials desiring information on the use of cast iron pipe for gas, water, sewers, road culverts or industrial needs should write to The Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer. People's Gas Building, Chicago, Ill.

✣ ✣ ✣

Cast iron pipe bearing the "Q-Check" trade mark is obtainable from the following leading pipe founders: Alabama Pipe Company, Anniston, Ala.; American Cast Iron Pipe Company, Birmingham, Ala.; James B. Clow & Sons, 219 N. Talman Avenue, Chicago, Ill.; Donaldson Iron Company, Emaus, Pa.; Glamorgan Pipe and Foundry Company, Lynchburg, Va.; Lynchburg Foundry Company, Lynchburg, Va.; National Cast Iron Pipe Company, Birmingham, Ala.; United States Pipe and Foundry Company, Burlington, N. J.; Warren Foundry and Pipe Company, 11 Broadway, New York.

This cast iron pipe, after 37 years service was found to be in perfect condition. Relaid in new location.



The "Q-check" symbol shown above has been adopted as the trade mark of The Cast Iron Pipe Research Association.

CAST IRON PIPE

THE BARTLETT HAYWARD COMPANY

Main Office and Works
Baltimore, Md.

Lincoln Bldg.
New York City

DESIGNERS AND BUILDERS OF

Complete Coal Gas Plants

Carburetted Water Gas Plants

Blue Water Gas Plants

Oil Gas Plants

By-Product Plants

De Brouwer Charging and Discharging Machines

Salt Water and Fresh Water Condensers

Tar Extractors

Purifiers

B. H. Co. Vertical Centrifugal Scrubbers
(Feld Type)

B. H. Co. Thickener
(Genter Type)

Steel Tanks

Vertical Waste Heat Boilers

B. H. Co. Westling Valve
(Patent Applied For)

Fast's Flexible Couplings

GAS HOLDERS

THE BARTLETT HAYWARD COMPANY'S MAIN PLANT

AMERICAN
GAS JOURNAL
Established 1859 Pioneer of the Gas Industry
Including GAS INDUSTRY Est. 1900

HENRY M. RILEY, *Editor*

Aiding Prosperity's Return

THE NATIONAL CITY BANK in its September review makes the following interesting observation: "Business reactions are as inevitable a part of business life as booms. It is not likely that they will be done away with as long as people tend to be optimistic and pessimistic in the mass and by spells." One can readily infer from this statement that the public as a whole is "all hog or none;" we seem to be given to either shouting prosperity from the housetops or else preaching a brand of hard times that is altogether unwarranted. In short, the average American it would appear, knows but two sorts of pockets; one that is easily burned by money or one that is literally constructed of four-ply asbestos.

Even now, when it is rather generally conceded that business has touched bottom and is on the upward turn, much timidity is in evidence. To be specific, salaried employees whose income has not been affected are showing an irritating apathy toward spending money for even what might almost be considered necessities. Thus we find men whose salaries have experienced no shrinkage in the past year hobbling along with two suits where they normally purchase three. Also, the families of these individuals have foregone their weekly roast of meat and have substituted a roast every other week. And so the merry round of keeping money out of legitimate circulation proceeds. Bringing the matter to the doors of our own industry, we see families in the class just mentioned deferring the purchase of a needed gas range or other appliance until some hazy time in the future.

It appears that the Gas Industry is in an excellent position to accelerate the upward trend toward prosperity. This can be accomplished by the constructive advertising and sale of appliances. Further, when we realize that hundreds of homes are visited in the course of the day by gas company employees on one mission or another, the opportunity for getting across a message of optimism is by no means meager. Thus, the meter reader who knows his party can truthfully state that business has started back, in the event the housewife gloomily chants a song of hard times. Meanwhile, the selfsame meter reader, whose salary has remained unchanged, might hie himself to the nearest haberdashery and purchase that brace of neckties he has been promising himself for the past six or eight months.

Home Service workers can also aid materially in the push toward better business, largely by reason of their very intimate contact with the housewife. Gas companies, it is felt, can assist to a marked degree in removing the searing poultice of depression from the chest of business.

Who Goes to Atlantic City—and Why?

DESIGNATION of company representatives to attend the A. G. A. convention is a matter worthy of more than usual attention. The executive of each company should undertake in his own mind to justify on the ground of company profits the sending of every man who goes. And yet in cases of doubt a man should be sent, for often the indirect stimulus and enthusiasm resulting from attending a worthwhile convention is in itself more than worth the cost.

Unfortunately at Atlantic City there are always found a certain number of gas men whose main objective seems to be to get away from home restraints and have a good time. Not infrequently such men are seen scurrying around during the last half day trying to get copies of papers presented at sessions which they did not attend in order that they may "impress the boss" when they get home. The boss is seldom deceived by such individuals, but oftentimes he finds it a little difficult to determine the basis upon which such a man shall be kept at home another year.

We suggest that any executive who has sent such a man in previous years call him into his office for conference. The question can fairly be put to him—"What have you done in the past eleven months for the benefit of our company that came as a result of your last trip to Atlantic City?" Those men who are after opportunity to consider the question carefully have nothing tangible to offer are probably not logical candidates for another trip at company expense. Such a question will not be a solution of all the executives' uncertainties, but it may be very helpful in some cases. We suggest that it be given a discreet trial in doubtful cases.

Appliance Profits Evaporate in High Service Costs

SOME TIME ago an apparatus manufacturer made a study of servicing costs incurred on different types of equipment which he marketed. He found that it was possible to make on one certain device a profit of approximately a hundred dollars per installation; but to his horror he found that the service expense on this device averaged over fifty dollars per year and continued more or less throughout the life of the instrument, which was almost always at least five years. The answer was that he lost money every time he sold such a device at its present price.

We wonder if many gas companies are not in the same fix with reference to certain gas-burning equipment. It will be highly desirable to make an analysis of servicing costs which will permit a determination as to the expense incurred on each type of equipment. Thus appliances for which the servicing costs greatly exceeded the profit from original sale and the profit from the sale of gas secured through its use are subject to two possible decisions. They can be abandoned altogether, an undesirable conclusion if it may be avoided. Or their price may include either an initial increase or an agreed service charge that is adequate to prevent continuing expenses not now cared for.

Gas companies having such evidence to submit will do well to take up their problem with the appliance manufacturer and secure his aid in the establishment of nationally uniform sales practices and service contracts. Cooperation for permanent profit is essential to the welfare of both the appliance company and the gas company.

The Melancholy Days

IT IS AMAZING to what extent some energetic souls will go in combatting any effort to induce them to open a book and study. This is not only true of individuals who have had the benefit of but little education but also applies to some college bred men. Regardless of their rate of advancement they evince a dislike for book learning that is, after all, merely an indication of mental laziness.

Gas companies are now pretty generally agreed that the future success of their business depends to a large extent on their men continually fitting themselves to occupy more important posts. And such fitness can be acquired in only two ways,—constant study of their particular job during working hours and study from books relating to their work during their off hours. Consequently, many companies not only urge their employees to pursue some course of study during the winter months but really go out of their way in order that this education might be acquired on virtually the employees' own terms, financially speaking. For the employee to cheat himself out of a lucrative future then, by alleging that he does not have the wherewithal to pursue a course of night study, is to lag behind the procession. In the direction of financial aid, not a few companies will defray practically the entire cost of such a course, provided the employee attains a certain reasonable grade.

It is a happy circumstance for those who are sincerely desirous of getting ahead that the Gas Industry welcomes and prays for brains and ability equally as well as any business that one can mention. Its problems are many and study on the side will enable the employees to master them and advance their interests accordingly. Therefore, as the ambitious soul burns the midnight oil he can cheer himself with the thought that these melancholy days are but the stepping stones to a successful and remunerative career of service. For those who will not avail themselves of such opportunity the melancholy days will come at the end of the trail—when they are the knottiest to untangle.

A Little Touch of Service

AT THIS SEASON of the year one's thoughts turn to the inside of the home and a great wave of refurbishing rightly sweeps across the land. Comes apace the heartening bustle of the new gas range being connected in the kitchen. the joy of the cellar being converted into a play room due to the installation of gas-heating, and other clinchinch evidence that the American housewife is, after all, more than passing interested in homemaking.

One Way to Revive Business

In this connection we were recently presented a problem and its solution by a gentleman who is literally a fiend on interior decoration and inside painting. This man decided that the coming fall would see him giving his kitchen its bi-annual coat of paint. As is generally the case, his gas range sets about five inches from the wall and this space obviously does not permit him to do a good job of painting immediately behind the range. Furthermore, he does not like the idea of having the range disconnected for several days in the event he decides to have available more space so that he can properly paint the wall behind it.

In such a situation, of which there are undoubtedly many throughout the country, he advanced the thought that the gas company could be notified of his intentions and then could arrange to disconnect the range, move it sufficiently far from the wall to permit easy working in back of it, and finally reconnect the range by means of a length of the proper type of flexible armored tubing. Incidentally, such tubing could have unions on either end. Then, after the painting job is completed, the gas company could reconnect the range in its original position.

By such a scheme the customer could go joyfully about his work of painting and, at the same time be assured of gas service for cooking. Offhand the idea appears to have merit and might be worth investigating.

The Engineer Turns Merchandisingward

IN THE RECENT PAST we have had several cases in the Gas Industry where engineers of considerable repute have been made managers of appliance sales. Not so many years ago such a procedure would have evoked not a little doubting head shaking on the part of the management and even now, those misinformed individuals who contend that salesmen and salesmanagers are in a select class far removed from the general run of workers can be expected to set up a plaintive wail that the thing just can't be done.

A casual examination of the tools used by the salesmanager and the engineer alike and the methods of applying these tools to get results, will readily demonstrate that there is much similarity in the two vocations.

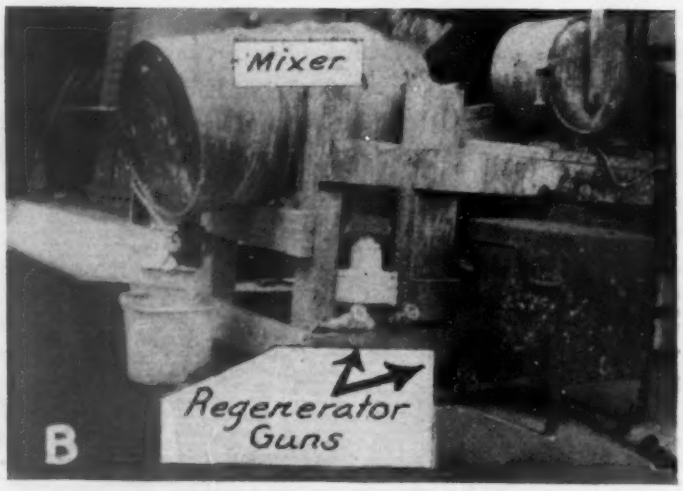
Under the old regime the sales end of most any business was built upon a number of intangibles. Of these, the personality factor was stressed,—at times to an extreme that reacted in the nature of a boomerang on sales volume. Similarly the engineer was guided largely by what is termed rule-of-thumb methods. Nowadays, these impedimenta have been consigned to their rightful limbo and in their stead rock-ribbed data and accurate knowledge based on mathematical truths are the order of the day.

It is true that "personality" is a valuable asset in any occupation. Thus, the engineer who is held in high regard by his men for reasons over and above his mental and productive qualifications can naturally be expected to receive a maximum of cooperation and loyalty. Hence, this attribute is not the private property of sales folks.

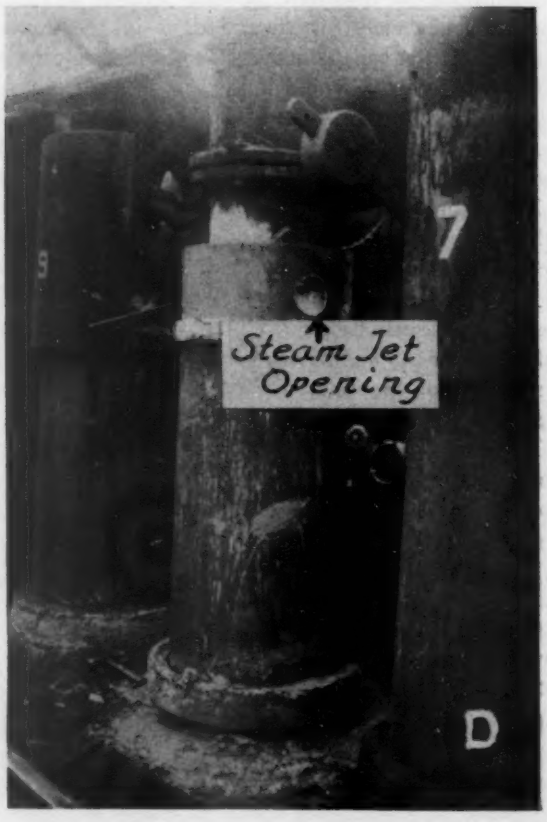
The engineer realizes the value of data which spreads through a cycle or over a period of time being depicted in the form of curves. Thereby is told a story far more valuable than reams of written description. In turn, the up-to-the-minute salesmanager is also dependent on curves and charts of past sales results as a guide as to just how he should shape his future activities. The engineer, in short, is a quantitative thinker; he lives in a realm of figures. The present-day salesmanager should also be a quantitative thinker and should measure his achievements with the yardstick of mathematics. And incidentally, the previous training of the engineer has undoubtedly sharpened his wits to the end that the transition to the position of salesmanager takes place in an easy and quite painless manner.

An epidemic of gas engineers metamorphosing into salesmanagers might turn out to be a prophylactic for any retarded *per meter consumption.*

Proper Tools Render Coke Oven Maintenance An Easy Task



A—Cement Gun
B—Mixer and Regenerator Guns
C—Standpipe Repair
D—Completed Standpipe Repair



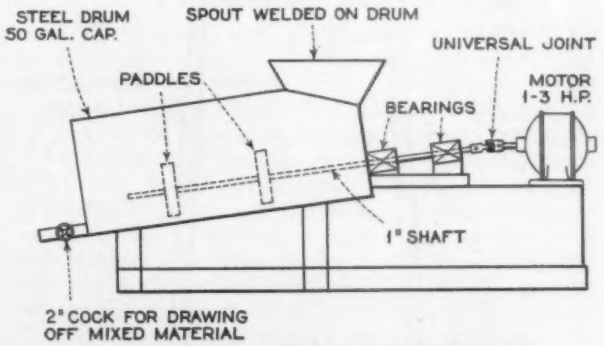
Coke Oven Operation and Maintenance

F. J. PFLUKE

Rochester Gas & Electric Corporation

THERE are now operating in the U. S. a total of 13,000 by-product coke ovens. These ovens are in batteries of various sizes ranging from the smallest battery of eight ovens to the largest battery of 1482 ovens and are operated by 83 different companies.

The tremendous investment represented by these ovens must be amortized over a period of years, at a rate depending on the care which the battery receives. With careful operation, inspection and maintenance the maximum length of life should be realized with a minimum of operating expense. However, with careless operation, inspection and maintenance the minimum life may be expected with perhaps several major repairs up to the time of complete rebuilding resulting in a high operating and amortization cost.



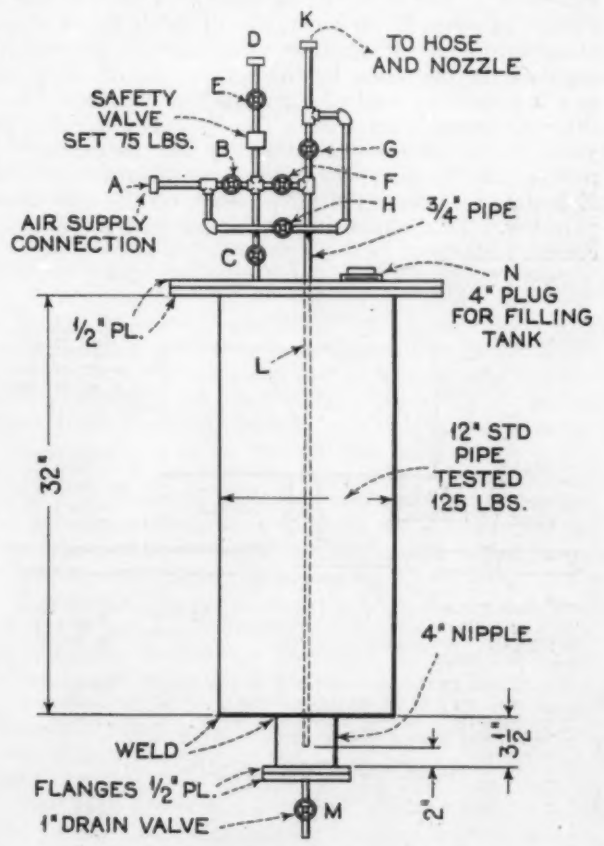
PATCHING CEMENT MIXER
FIG. 1

Most of the larger operators realizing the importance of rigid inspection and continuous and careful maintenance, have in their organization men specially trained in this work. However many of the smaller companies feel they cannot afford the trained supervision employed by the larger operators and delegate the care of their ovens very often to inexperienced men. It is chiefly for the benefit of these smaller plants that a series of articles on "Coke Oven Operation and Maintenance" of which this is the first, will be written. No doubt the larger operators may also find in this series some suggestions which will prove valuable to them.

A coke oven battery is essentially a mass of brick work held together by structural steel and concrete. This brick work is subject to wear from coal and coke. The brick joints are subject to loosening due to expansion and contraction. For efficient operation and long life we must keep the worn brick patched and loose joints pointed up. A tight oven setting is absolutely essential to prevent loss of gas by leakage and to insure efficient operation and long life. In this series we shall speak specifically of the Becker type oven. However, most of the procedure may be applied to almost any type oven.

To do efficient oven maintenance work we must have the proper tools. Fortunately the necessary tools are very simple and inexpensive so that the smallest plant may be as well equipped to maintain its ovens as the largest.

The first requirement is a means of mixing the patching cement. Nearly all the refractory cements on the market require a thorough mixing with water and some with a gannister composed of crushed fire brick. This mixing may be done with a hoe and mortar box but unless extreme care is taken a thorough mixing will not be obtained. It is highly recommended that an automatic mixer either be purchased or constructed. A very satisfactory mixer may be constructed from junk which may be found around almost any gas plant. Fig. I shows the details of construction of a very simple mixer.

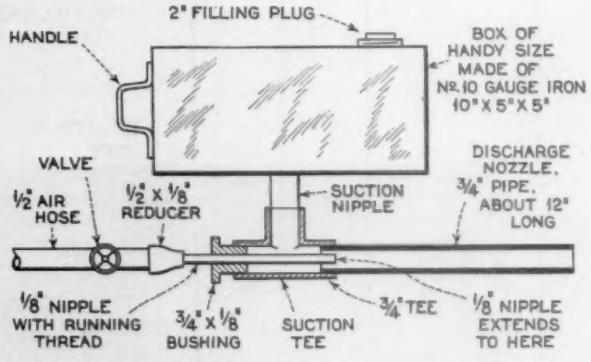


CEMENT GUN
FIG. 2

For efficient oven patching a cement "gun" is almost a necessity. There are several good "guns" on the market but an excellent one can easily be made. Fig II

shows the details of construction of a "gun" used at Rochester with very good results. It has been found economical to mount one of these guns on each of the following pieces of equipment—coal larry, coke-side clay car, and pusher-side clay car. Photo A, see Frontis, shows the method of mounting on a coal larry. However, if it is desired to have only one "gun" it may be mounted on a suitable truck making it portable. It must be remembered that each time after using the mixer of gun it should be thoroughly washed out.

Referring to the sketch, valves represented by X are quick opening valves. Others are gate valves. Pipe L extends into body of "gun" within 2" of bottom of the body. An air hose is attached between A and the air supply pipe. A hose with a ½" pipe nozzle of any desired length is attached to K. To operate the gun it should be filled through the 4" plug with cement. The cement should be kept as thick as possible but not too thick so as to plug up the nozzle. The consistency will have to be determined by trial. To operate the gun valves H, E and F should be closed. Valves C and G should be opened. When ready to patch the operator should turn on the air then open valve B slowly and regulate the operation by this valve. After using the gun it should be washed out by filling with water and draining through valve M. The by-pass controlled by valve H. is used for air cleaning the surface to be patched and by blowing out the hose after use. Valve E is used to release the air pressure on the gun when patching. This makes it possible to stop the flow of cement instantly.



WHEN EXTENSIVE PATCHING IS NECESSARY THE BOX MAY BE DISCONNECTED, A NIPPLE ABOUT 12" LONG INSERTED IN THE SUCTION SIDE OF THE TEE AND A PAIL USED FOR THE CEMENT RESERVOIR.

REGENERATOR GUN
FIG. 3

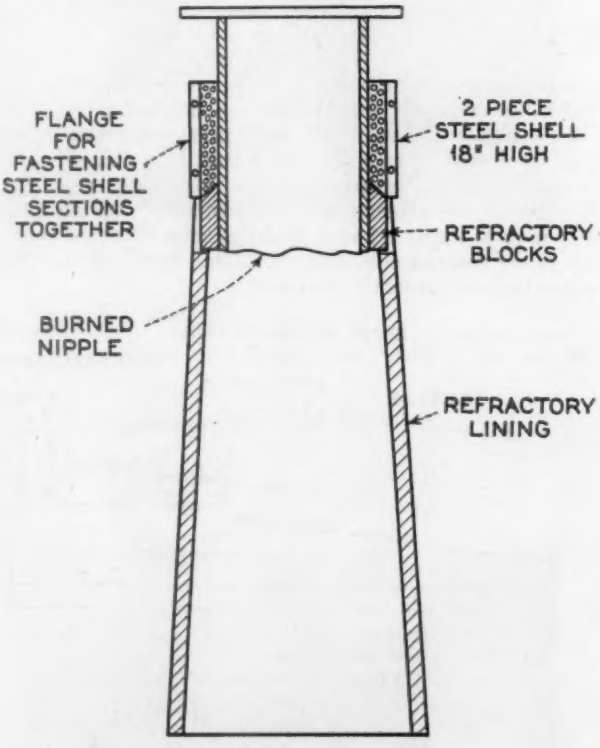
For patching regenerator walls a "gun" shown in sketch "III" is excellent. To change this gun into a larger gun for extensive patching which may also be used for tar a steel box 18" x 18" x 18" mounted on skids or wheels may be substituted for the small box. In using tar in the gun steam must be used in place of air. Best results are obtained if the steam is dry. Photo B, See Frontis, shows the mixer and regenerator "guns" used at Rochester.

The other tools necessary and which no doubt practically every gas plant uses are trowels with handles of various lengths, chisel bars, air hose, chipping hammers and a shield consisting of an angle iron frame covered with asbestos. This shield should be large enough to fit inside the oven and should be provided with means of holding it in place.

The refractory cement to be used should be selected with great care. There are a number of very good high temperature cements on the market. The cement selected should have a high fusion point and good sticking qualities so that it may be applied without excessive waste and without any danger of fluxing at high temperatures.

Maintenance of Oven Walls

The oven operators such as top men, pusher operators, and door machine operators should be trained to observe the condition of the ovens as they push and charge daily and should report any abnormal conditions which they find. However, there should be an engineer or experienced mason trained to periodically inspect all brick work thoroughly, after which any necessary repairs should be made.



STANDPIPE REPAIR
FIG. 4

The oven walls should be inspected at least twice a year for wear or spalling. Wear is apt to occur at the door jambs, near the top and bottom of the door frame where, due to carelessness on the part of the man cleaning the door frame corners, the scraper hits the brick.

Spalling is found at the offtakes often due to a defective standpipe spray throwing liquor onto the walls. Where steam is used in charging carelessness in neglecting to drain the condensate out of the steam nozzles before inserting into the standpipe will allow water to run onto the walls causing spalling. Spalling or wear may be found at the charging holes especially where lump coal is used due to the coal striking the walls and large lumps lodging between the walls and the leveling bar producing a grinding action.

The cause of worn or spalled spots should be determined and corrected if possible, and the spots patched. A very satisfactory patch may be made with a cement gun. Care should be taken to clean all carbon

off the part to be patched and then the cement applied in thin layers not to exceed ¼" thick. Each layer should be allowed to dry before applying the next. If the patch is put on with a trowel it likewise should be applied in thin layers.

The walls should be examined for poor joints and any which are discovered should be repointed either with the cement gun or by trowel. Many ovens are provided with openings between the oven chamber and heating flues which are used in "heating up" the ovens after which they are plugged. Very often these plugs become loose and should be patched up. The oven floors and roofs should be carefully inspected and any poor joints patched.

Door Jambs

One of the most important points of oven maintenance is the patching of door jambs. This part of the oven is subject to expansion and contraction which takes place when the oven is pushed and recharged and to shock when the door is replaced. Unless the jambs are kept well patched serious gas leakage will take place between the ovens and heating flues. Door jambs should be sprayed with a cement gun at least once each month. Before spraying the jambs all carbon and coke should be cleaned off the brick to insure a lasting patch. Some operators prefer to patch jambs with a trowel. This method is much slower than spraying and requires more skill.

Regenerator Walls

The importance of tight regenerator walls cannot be emphasized too greatly. It has been the experience of the writer that the majority of heating difficulties are due to regenerator leaks. Very often the heater will spend a great amount of time changing dampers and pressures to correct heating difficulties when all that is needed is a little work on regenerator walls. When underfiring with producer gas, a regenerator leak is easily detected by examination of the end of flues. The gas port will appear brighter due to the combustion in the regenerator of the gas with air leakage. When underfiring with oven gas it is more difficult to detect a leaky regenerator wall. An abnormally low draft reading is perhaps the best indication although this condition may be due to other causes as will be outlined in a later article. After a leaky regenerator has been found the location of the leak is perhaps even more difficult. A large leak may be detected after dark by turning out all lights in the "alleyway." However most often a leak cannot be seen. It will often be found after several years operation that the patching material has separated from the brick face, and formed a crust and although the walls appear to be well patched if tapped with a bar a hollow sound will result indicating the separation. In such a case all the loose material must be removed from the walls before patching.

A very effective means of locating small regenerator leaks is by means of a torch. The flame should be played on all parts of the regenerator face and any leaks will suck in the flame.

All joints formed by castings set in the regenerator walls such as regenerator peep hole castings, gas and air box castings, and gas guns should be carefully inspected and flame tested at least three times a year. If leaks are discovered in these joints they should be stopped by plugging in asbestos rope dipped in the portland cement.

After the leaky walls have been prepared by removing loose patches and plugging all large joints they should be sprayed with the regenerator gun described in Fig. III using the following mixture which has been found to be very effective.

1 part finely powdered asbestos
1 part portland cement
1 part fire clay
Add water to make a thin batter.

Several thin coats of this mixture should be sprayed on the walls until the face is well covered. Care should be taken to be sure all inaccessible joints are sprayed, such as under and between gas and air boxes, back of buckstays. After this coating has set for two days it should be sprayed with tar which has been boiled to drive off the lighter oils using the tar gun described in Fig. III. The tar may be applied with brushes if it is desired. However it is recommended that the spray be used as it is possible to reach all parts of the walls by this means. The tar spray gun is operated by steam which must be dry for best results.

In addition to the very thorough inspection and repair described above the regenerator faces should be sprayed or painted with tar at least once a month. This will seal up any cracks which develop and will insure tight regenerator faces.

Fuel Gas Guns

Where the ovens are designed to be underfired with oven gas careful attention should be given to the fuel gas guns. This is especially true for ovens designed to burn either producer or oven gas and where frequent changes are made from one form of underfiring to the other, or where producer gas is used almost continuously. When producer gas is used the gas guns are subject to great temperature changes which cause leaky joints mostly near the gas inlets to the guns. This is due to the excessive heating when the wall is burning and the excessive cooling due to the decarbonizing air pulled through the gas gun when the wall is "off." When operating on fuel gas the trouble with leaky joints is not so excessive because of the more uniform temperature which is maintained. The cold fuel gas passing through the gas gun tends to keep it fairly cool so that the decarbonizing operation does *not* cause such an excessive temperature change.

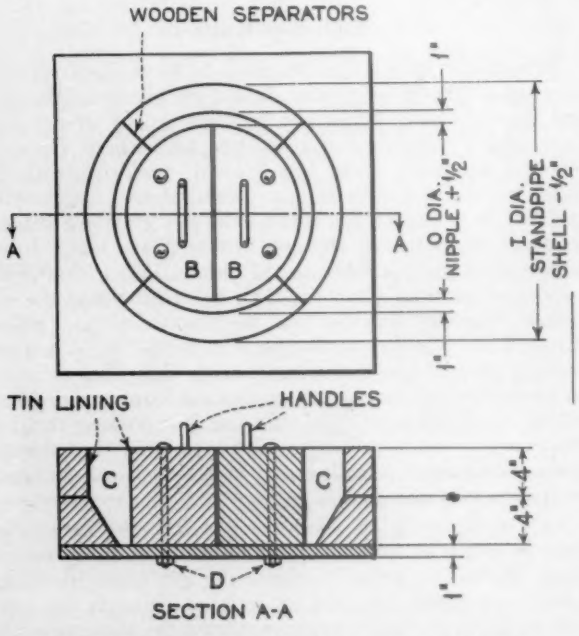
When operating on producer gas for long periods of time oven gas should be used at least once every two or three months in order to check the gas guns for leaks. Leaks are easily detected by looking through the peep hole at the top of each regenerator of the burning walls. If there is a leak a flame will be seen burning from the gas gun into the regenerator. The location of all leaks should be noted and a mason should repair all leaks by forcing high temperature cement into the leaky joints. The patching of gas gun leaks requires a great deal of care and patience. Caution should be exercised not to build up cement in the gas gun so as to restrict the passage.

Often the sleeve connecting the first gas gun brick with the cast iron gas gun will be found leaking. This can be repaired by forcing asbestos rope soaked in high temperature cement between the sleeve and casting with a long chisel bar after which high temperature cement should be applied.

Stand Pipes

Many ovens are equipped with refractory lined standpipes which present a special problem of maintenance where steam is used in decarbonizing the ovens. The cast iron nipple connecting the refractory lined shell to the elbow is very often burned due to air being sucked

in at the joint between the two. To replace the nipple is quite an expense but a very satisfactory repair can be made cheaply. Referring to Fig. IV a two piece steel shell about 18 inches high is made of No. 10 or No. 12 gauge iron. This shell should be rolled to a diameter slightly smaller than that of the inside top of the standpipe and should be set inside the standpipe shell on top the refractory lining. It should then be bolted together and refractory material such as that used to line the standpipes should be rammed into the shell. If the nipple is badly burned so there is considerable space between it and the stand pipe some special bricks made of the same refractory material should be first set inside the shell on the stand pipe lining to prevent the shell lining material from being forced into the standpipe. Photo "C," See Frontis, shows a standpipe being repaired. Half of the steel shell and the special blocks are shown in place. Photo "D," See Frontis, shows the job complete. It also shows the opening left in the shell for the steam jet; a pipe nipple is placed between the steel shell and the cast iron nipple and around the steam jet before ramming in the refractory lining.



RAM REFRACTORY MATERIAL INTO SPACE C
REMOVE NUTS D AND WITHDRAW FORMS B.
REFRACTORY BLOCKS MAY THEN BE
REMOVED FOR DRYING.

REFRACTORY BLOCKS FORM
FIG. 5

The blocks can be easily made by building a form as shown in Fig. V. The form is well greased and pieces of tin or thin wood placed in it to make four sections. Refractory material is then rammed into the form. The removable center of the form is first lifted out and then the blocks removed. They should be placed on top the ovens to dry out thoroughly before using.

This repair can be quickly made without seriously affecting the charging schedule.

The maintenance of the joints between the ovens and standpipes and standpipes and nipples is a very difficult problem. These joints must have constant attention to keep them tight. The writer has found no entirely satisfactory patching material for these joints and at present is using luting clay with fairly satisfactory results.

OVENS INSPECTION SCHEDULE

WEEKLY

	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
REGENERATOR TOPS					
END FLUES					
GAS GUN LEAKS					
MONTHLY	1	2	3	6	12
AIR REGENERATOR SOLE FLUES					
DOOR JAMS PATCHED					
CHARGING HOLE JOINTS					
DRAFTS					
GAUGES CHECKED (USE WATER GAUGE)					
COLLECTOR AND SUCTION MAINS TESTED FOR PITCH					
PRODUCER GAS MAIN TESTED FOR STOPPAGE					
PUSHER RAM OVERLOAD RELAYS TESTED					
PRODUCER GAS TESTED FOR TAR AND DUST					
TWO MONTHS	1		2	3	6
EXPANSION JOINTS INSPECTED					
SEMI-ANNUAL	1				
GOVERNOR OIL CHANGED					
ALL WALLS ON FUEL GAS					
OVEN FLOORS, WALLS AND ROOFS					
STAND PIPE LININGS					
LIQUOR SPRAYS					
YEARLY				1	
DUST REMOVED FROM GAS AND AIR REGEN. FLUES					
CHUCK DOORS REPACKED					

AFTER INSPECTION IS COMPLETED, INITIALS SHOULD BE PLACED IN SPACE PROVIDED.

FIG. 6

Oven Doors

The oven door brick lining is subject to very severe service and should be watched very carefully and kept in good condition. If the broken brick are not replaced coal will be allowed to come in contact with the door jambs making excessive jamb cleaning necessary. The door brick should be as large as possible in order to reduce the number of joints. A very satisfactory brick is about 5 inches high. In the bottom two feet of the door hollow cast iron brick filled with fire clay should be used. If clay brick are used excessive repairs will be necessary because of the breakage of the brick with cleaning tools.

Miscellaneous Inspection and Repairs

In addition to the above important items of inspection and maintenance there are a number of equally important parts of the battery which are often overlooked due to the fact that very little trouble is usually experienced with them. However, for long continuous oven operation these items should be carefully watched.

Miscellaneous Joints—The oven top brick joint should be kept carefully pointed up in order to prevent water getting down into the brick. The brick joints between buckstays should also be kept carefully pointed up to prevent leakage.

Door Sills—The cast iron door sills on which the oven doors rest should be regularly inspected to be sure they do not work loose, and project above the floor brick offering an opportunity for catching the pusher ram shoe.

Buckstays—The buckstays should be carefully watched for warping. If any signs of warping are noticed the cause should immediately be ascertained and corrected.

Chuck Doors—Chuck door frame bolts should be kept tight and the packing renewed when necessary to eliminate leakage. Chuck doors should be kept clean of excessive carbon which tends to prevent tight closing.

Regenerator Sole Flues—The gas and air regenerator sole flues which run under the regenerators from the gas and air boxes should be inspected twice a year. The gas regenerator flue is usually quite difficult to inspect. A very simple way to see into this flue is to place a light reflector attached in the flue and set a mirror in the gas box at 45 degrees when the wall is off. This will give a very clear view of the flue. Any dust accumulated should be blown out when the wall is off in order not to carry the dust up into the heating flue.

In order to be sure that the inspection work is not forgotten or some items overlooked it is well to have a chart indicating the items to be inspected and the time it is to be done. Fig. VI shows a chart used at Rochester.

If the inspection work outlined is done systematically and conscientiously the effort will be repaid many times over in efficient operation and long oven life.

(*Continued in October Issue*)

Publication should Assist in Water Heating Sales

IT is rather well agreed that gas water heating is not only a very desirable load to take on but its field is also one which is very far from being saturated. Not so many years back facts and data relative to this phase of gas utilization was both scattered and scant; consequently, such information could be virtually carried in one's head. As time passed new data was unearthed but the same was not collected in a handily available form, and, of course, it also became impossible to retain this data in one's memory. It is true that sporadic and more or less incomplete efforts have been made from time to time to compile this data in book form. The last word in this connection would appear to have been said by way of the volume, Walter Heating, recently published by the American Gas Association. Its excellence both as regards text and manner of presentation will be readily appreciated by a considerable coterie of gas men.

The work, which lays special emphasis on large volume water heating, discusses the economics of water heating, the effect of rates on the volume of business, and sales aids. It then proceeds to describe the various systems and accessory equipment estimate of requirements for various jobs, efficiency and other pertinent phases. One interesting portion of the book analyzes a number of definite water heating jobs.

The fact that the heating of swimming pool water by gas is discussed is rather convincing proof that the work is quite up to the minute.

Particular commendation is due the editors of this work for the truly excellent illustrations which have by no means been used sparingly. However, it is to be regretted that a somewhat less gaudy and more durable cover was not used. Non-members of the A. G. A. may obtain this book at $3.00 per copy. However, responsible firms who are in a position to cooperate with their local gas companies to mutual advantage may be allowed to secure copies at a much reduced rate on application to their local gas company.

Government Helium Plant Achieves New Record Output and Reduces Production Costs

THE Government helium production plant at Soncy, near Amarillo, Texas, produced during May the largest quantity of helium ever turned out in one month by any helium plant, it is announced by the United States Bureau of Mines, Department of Commerce, which operates the plant. During the month the plant produced 1,230,350 cubic feet of the nonflammable gas used in airships, containing 97.93 per cent, or 1,204,900 cubic feet of the element, helium. The operating costs, per thousand cubic feet of helium produced, were the lowest on record, and far below any cost figures deemed attainable by specialists in helium production a few years ago.

The month also saw the completion, testing, and preliminary operation of the second separation unit of the plant.

At the May costs, helium, to fill one of the 6,500,000 cubic foot airships now being built for the Navy, could be produced by the Amarillo plant with net expenditures from the Treasury of about $50,000.

Drilling of wells to supply the Amarillo plant was started in February, 1928. The first separation unit of the plant was placed in production in April, 1929. Since that time efficiency of the plant has steadily increased and there has been a marked reduction in operation costs.

The plant was designed for an initial installation of two separation units, with buildings and auxiliary equipment, to accommodate a third unit when needed. As the first unit would supply present demands, completion of the second unit was allowed to await operating experience under the conditions at Amarillo. As a result, the second unit, completed in May, is even superior to the first one in operating efficiency.

With the second unit completed the plant has a capacity of 24,000,000 cubic feet of helium per year, which is ample to meet the needs of the Army and Navy when the Navy's two new 6,500,000 cubic foot ships are completed. When the plant has a demand that justifies operation of both units continuously, operating costs, per thousand cubic feet of helium, will be much lower than at present.

The entire development of production of helium has occurred since 1917. Prior to that time helium had been obtained only as a scientific curiosity in laboratories. Probably the total quantity isolated in the whole world did not exceed 100 cubic feet and the cost of producing it was from $1,700 to $2,000 per cubic foot. Now the Bureau of Mines is prepared to produce it at the rate of 2,000,000 cubic feet per month at operating costs well below one cent per cubic foot.

Rubber Protection for Equipment in the Gas Plant

H. E. FRITZ

The B. F. Goodrich Rubber Company, Akron, Ohio

Rubber Lined Chute for Handling Abrasive Materials Shows Distinct Saving Over Metal

RUBBER has many admirable properties, but its corrosion and abrasion-resisting properties have the greatest interest for engineers. Utilization of these properties of rubber has, however, always presented a difficult problem owing to the other limiting factors, such as lack of rigidity, lack of strength, etc. The discovery of the Vulcalock process, in which rubber is bonded to metal, has overcome some of these limiting factors, and has placed in our hands a new construction material, possessing a combination of properties which are very useful in solving baffling corrosion and abrasion problems. Rubber covered metal is rigid, has tensile strength and, in addition, the desirable corrosion and abrasion-resisting properties common to properly compounded rubber.

Corrosion-resisting construction material should be such that when subjected to general factory conditions, it will be serviceable over an appreciable period, regardless of shock, strain, and vibration which are often present to a degree sufficient to eliminate the use of any fragile material. Such a material will greatly decrease replacement and maintenance cost and even might lead to a revival of manufacturing processes which are in the discard as a result of the absence of a suitable construction material.

Rubber Lined Pipe Handling Washed Flue Gases

Rubber coating and rubber parts have been found effective in meeting the needs of many corrosion-resisting applications and are finding wide use. The field has appeared sufficiently attractive for large rubber manufacturers to concentrate their efforts on producing compounds effectively to resist corrosion, and rapid progress has been made in the solution of manufacturing problems and methods of mechanical attachment. Rubber is now effectively resistant, without contamination, to all the acids except nitric and highly concentrated sulphuric. Rubber will successfully resist the corrosion of 50 per cent sulphuric acid, 85 per cent phosphoric acid, and the common corrosives such as hydrochloric acid and hydrofluoric acid. Salt solutions present no problem at all when stored and transported in rubber-lined containers.

Very recently a rubber material known as "Super Flexite" has been developed which has some very admirable properties for use in gas works. This material has almost the consistency of leather but is very resistant to sulphur dioxide, dilute sulphuric acid, ammonia gases, acetic acid, and many other chemicals encountered in gas and allied production. This Super Flexite can be perfectly bonded to metal and is practically indestructible. It serves admirably under vacuum at low temperatures.

The range of physical properties, uses, and costs of the many different rubber compounds is probably as great as the variation in iron and steel and their alloys. For this reason it is always advisable in making and selecting rubber products to carefully consider the

service, so as to select a suitable compound either by experimentation or through the help of past experience.

Abrasion resistance by a good grade of rubber has beeen known for some time and special study has been given to the compounding of rubber for various kinds of abrasion-resisting service. For those who are not familiar with this quality of rubber, the example of the automobile tire and the skid chain is convincing. All who have used skid chains on their motor cars know that the hard alloy steel links, when exposed to bare brick or concrete, will wear to a point of failure in a few hundred miles, while the tread of a good tire will travel thousands of miles, absorbing abusive impact and friction without showing any appreciable signs of wear.

Another striking example of the abrasion-resisting quality of rubber is evident in the protective cover of conveyor belts, which carry millions of tons of sharp abrasive ore, coal, coke, and rock materials before the failure of a cover thickness often not exceeding ⅛ inch. Many other similar instances could be cited where rubber, when properly applied, is meeting the need as an effective covering in places where abrasion is present to a destructive degree. Those cited here are sufficient, however, to indicate that the field of useful applications will have a very wide range.

Successful Adhesion of Rubber to Metal

The Vulcalock process is one for attaching rubber to metal more securely than is possible through the adhesion afforded by cement or glue. A mechanical anchorage can be effected between a metal surface and hard rubber and, in turn, an adhesion between the hard and soft rubber, but this method is not considered altogether satisfactory from the standpoint of cost, and because it lacks flexibility. Through a process of elimination and an accumulation of experience, the laboratories of a large Akron rubber manufacturer have discovered a process which permits of soft rubber being applied directly on a smooth metal surface. Adhesion between the two materials is so complete that they appear to be integral, and the bond approaches the tensile strength of the rubber itself. Adhesion tests have been made to show a strength in excess of 700 lbs. tensile strength to the sq. in. The end of a steel bar with 1 in. cross-section area was attached by the Vulcalock process to another piece of steel, and the strength of this bond was demonstrated by supporting the weight of two large men without any sign of failure. This new process has been found successful also in attaching rubber to other metals, such as brass and aluminum, also to wood and concrete.

The Vulcalock process brings into use a new industrial material which incorporates the strength and workability of steel with the desirable abrasion and corrosion-resisting surface of rubber. The attachment requires processing the metal surface, such as sand blasting or pickling, and special preparation of the rubber stock in its uncured form. The pliable, semi-plastic gum is applied to the metal and cured in place, and it is during the curing operation that the remarkable adhesion is set up. The only limiting factor of the Vulcalock attachment is heat, and at present its application cannot be conservatively recommended where the operating temperature exceeds 150° Fahr.

The same process has been successfully used for the attachment of tubed or sheet rubber in standard steel pipe and fittings, including special valves. The rubber is so applied that all metal contact is eliminated, giving the pipe a three-fold utility, to resist abrasion, to resist corrosion, and to conduct liquids which are subject to contamination from metal contact. Rubber-lined tanks and pipes will withstand internal pressure corresponding to the strength of the metal. This permits tanks to be discharged and contents transported safely by air pressure, eliminating pumps.

Lining of steel tanks, receptacles, and tank cars with soft rubber is proving acceptable in the chemical and allied industries, and rubber is taking the place of less corrosion-resisting and more fragile linings. Railroad tank cars have been lined by the Vulcalock process in sufficient numbers to have developed a standard method for the lining. Special equipment has been provided and special men have been trained in this class of work. It is desirable to have a tank shell with a smooth, clean metal surface and cure in place with uniform thickness, inside surface so that the rubber will conform to the without any open joints, which would destroy the purpose of the lining.

The increasing favor with which the chemical industry is beginning to look upon rubber as an acid-resisting agent is shown by the large number of rubber-lined tanks, gas pipes, drums, barrels, etc.—to the value of many thousands of dollars—which have been supplied by rubber manufacturers during the past six years to the largest chemical plants in the country. This, in itself, should prove a sufficient incentive to induce gas undertakings to investigate its possibilities.

An industrial committee is maintained for the purpose of better serving industry on these severe-service problems. This committee is at the service of the gas industry and stands ready to make recommendations relative to design and construction in cases where corrosion and abrasion present very vexing problems. The field of possible application is so broad and intricate that it is practically impossible for engineers in the rubber industry to acquaint themselves with all of the problems involved. It is, therefore, logical to expect that many of the future developments in rubber will come from outside the rubber industry. Progress will, without doubt, be measured by the willingness of engineers to carry on joint investigations in an effort to produce the old results by new and more efficient methods.

Taking Up The Slack

DUE to the change in living conditions, in the ordinary family of today, there has been a tremendous reduction in the amount of fuel used for cooking purposes. The cooking load has diminished in the year 1930, in natural gas territory, to a point approximately 350 to 450 cubic feet per month per person and is still on the decline. To meet this startling reduction in our cooking revenue, we have a most effective weapon in gas refrigeration, which uses approximately 900 cubic feet of natural gas per month for the ordinary domestic size. This figure is based on actual tests made throughout Southern California where the refrigerator has been in use for four years.

The tendency of the housewife to be weaned from the kitchen which is reflected in our declining domestic load, is being reversed by the gas refrigerator, where in new cooking and freezing interests in the preparation of food is actually resulting in the use of more fuel in the home.—*Refrigeration Committee, The Pacific Gas Assn., 1930.*

The Gas Producer

II-Operation and Items related to Operation

JOHN W. ROMIG

(*Continued from August issue*)

THERE are many views on the operation of industrial gas producers. Very often in a single plant there are as many views as there are attendants and others connected with the producer department. So the general aspects are treated lightly and the more specific and important points are given more weight in the following discussions. As fuel prices increase the importance of good producer gas and curtailment of waste become increasingly important.

The method of producer operation is dependent somewhat upon the make and type of producer. It is impossible to discuss herein the operation of each type and make of gas producer and as all are fundamentally the same, the operation of a Chapman water vapor gas producer fitted with the fuel bed agitator and automatic stoker will be covered.

Kindling the Producer

In the operation of a gas producer the unit must be prepared for the fuel and the zones started before gas is formed in quantities. The first step is to form the ash bed so the producer shell is charged to a level about 8 inches above the top of the tuyeres or grates with ashes and cinders. Kindling wood is placed about 6 inches deep over the ash bed and waste or rags saturated with oil placed with the wood, so that it ignites easily and evenly when a torch is applied. The openings at the top of the producer, poke holes and clean-out doors are kept open and a small opening is left in the brickwork closing the manhole in the shell of the producer. The torch for touching off the waste is inserted through this opening, which may be closed as soon as the fire is well started. A caution to follow in placing the wood is to have it level and about four inches below the lowest extremity of the agitator arms, so that the wood bed will not be torn up when the agitator is started. Figure No. I shows the preparation of the producer for lighting the fire.

After the waste and wood are well ignited a little air

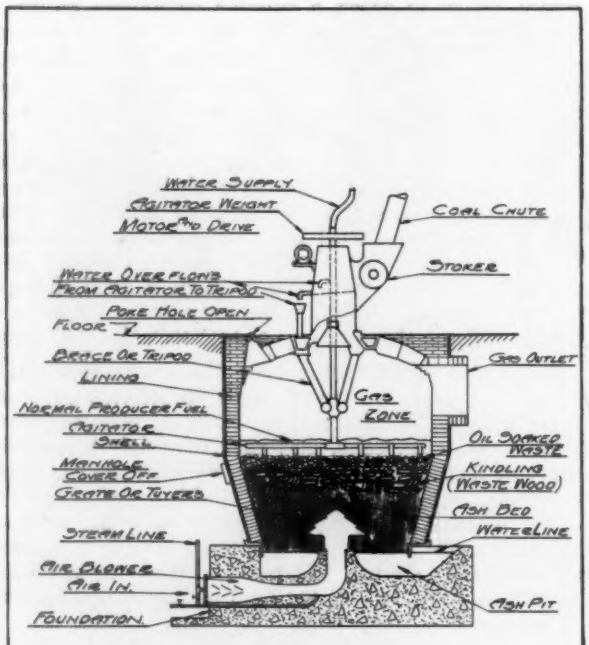


FIG N° I SECTION OF A SEMI-MECHANICAL WATER VAPOR GAS PRODUCER SHOWING PRODUCER READY FOR FIRING

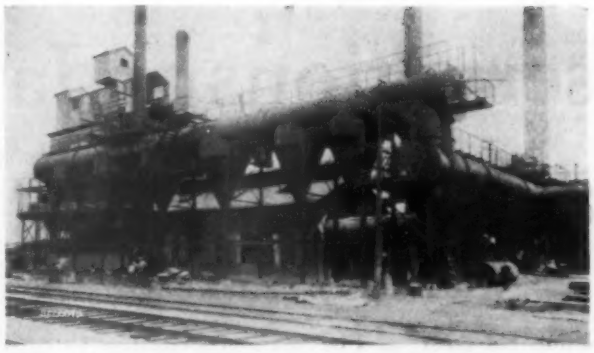
should be forced through the tuyeres to aid in combustion. As soon as the fire becomes hot, small quantities of coal are discharged on the fire and as it burns, more coal is added. At the end of one to one and one-half hours the producer should be making rich gas at close to its capacity. One cause of trouble in starting a producer is the failure of many operators in placing sufficient ash bed above the tuyeres or grates to secure a good distribution of air throughout the bed. If the air distribution is uneven it is difficult to get an even wood fire and even combustion zone, so the producer will not be gasifying evenly over the bed area. The unevenness of gasification of course reduces the capacity of the unit until the fires are poked and worked over.

Once the gas has become a creamy yellow color as it issues from all openings, the producer may be put into service without disturbing the equilibrium in the gas conduits. Then all openings in the top are quickly closed, and the producer is then ready for intermittent or continuous service.

Guides in Producer Operation

Three principal guides are used in the producer operation. First, the color of the gas evolved when the poke hole balls or peek hole doors are removed. If the gas is thin, pale blue, or gray, the gas is usually of poor quality and undoubtedly there are holes or chimneys in the fuel bed through which the air and steam from the blast are passing, thereby giving uneven air and steam distribution throughout the bed. Second, the results of analyses using the modified Orsat apparatus hereafter described are of value in checking operation. Low CO_2 and high CO are the aims of the gas producer engineer. Third, clinkering troubles are caused by running the incandescent bed too hot, as bed temperatures above the fusion point of the ash cause the ash to

melt and fuse together, the result being a "frozen" ash bed. Clinker formations are broken up by driving bar or by vigorous poking with hand bars. In order to control the incandescent bed temperature, the temperature of the air-steam mixture entering the tuyeres is kept sufficiently high so that the endorthermic reaction of the steam passing through the bed cools it below the slinkering temperature. In producer practice the temperature of the mixture is known as the "Bugle" temperature. The "bugle temperature" is derived from the air injector commonly known as the bugle.



A Typical Producer Plant

A low bugle temperature may be used with high fusion ash coals, while with low fusion point coals a high bugle temperature is required. A high bugle temperature indicates a high steam to air ratio and probable excessive flow of steam into the producer, while low bugle temperatures indicate the opposite. For a 2150° Fahrenheit ash fusion point, a bugle temperature of about 140° Fahrenheit with 80° Fahrenheit air, when supplying the proper amount of air for good gas, has been found to give a happy medium between excess steam and clinker trouble. The air supplied may be regulated either with the steam or separately. It is customary, after the proper bugle temperature has been found, to set the air adjustment and during operation to vary the air by increasing or decreasing the quantity of steam admitted.

In determining a proper bugle temperature for a certain coal, it is well to start at a high bugle temperature and drop to the temperature at which clinkering becomes troublesome, then raise the temperature to the point where some clinkers form but the formation is not troublesome. It is difficult to hold the ash bed of a producer if the ash is too finely divided.

Various thicknesses of the producer zones are found in practice. Best results with the low fusion ash, Illinois coal, have been secured with 8 to 12 inch incandescent and dissociation beds combined and a 4 to 8 inch green fuel bed. It is difficult to hold the reaction and incandescent zones to 12 inches, and more often 8 to 9 inches are actually found in practice. The hot zones are found by inserting a poker from a poke hole down through the zones to the ash bed and allowing it to remain for a short time. The length of red hot poker is measured upon withdrawal, the result being the approximate incandescent zone thickness. The entire bed may be explored in this manner if desired. Thick fuel beds tend to cause excessive tar contents in the gas because of the low gas temperature, with resultant deposits in the washers and conduits. Thin fuel beds as well as thick beds have tendencies to burn through and this difficulty is relieved by poking the fire and working the ash bed into the proper condition.

With the Chapman agitators the rotating arm is allowed to rotate about 4 inches under the fuel bed and as they rotate the bed is evenly worked aiding in the fuel distribution and the projectors or fingers underneath are continually disturbing the fuel and the dissociation beds. An ash bed with the upper surface 6 to 8 inches above the grates or tuyeres gives good air-steam distribution. Too thick or too thin an ash bed will disturb the equilibrium of producer operation. The producer operation is very much dependent upon ash bed condition and for good operation the ash bed must be kept porous and open and high enough so that good airsteam distribution is secured.

When new fuels are being tried out, considerable experimentation is necessary before adjustments can be considered as fixed. The first thing to determine with a new fuel is the best condition for operation from the viewpoint of producer attendants, and secondly the operation from the viewpoint of efficiency of gasification must be determined. It must be remembered that richness of a gas may not be indicative of best producer efficiencies; the real guide is the total quantity of heat delivered from the producers. The value is the product of the number of cubic feet of gas per pound of coal times the number of heat units in a cubic foot of gas. Allowance must be made for inerts which carry sensible heat out of of heat.

The secret of economical producer operation with a given fuel lies in attendance and supervision of attendants. Producers operating with holes in the bed will burn as much as ten percent of the gas inside the producer. CO_2 recorders will show much carelessness in operation, or a temperature recorder showing the temperature of the gas will indicate a rise in gas temperature unless the operator dumps a lot of coal on the bed and keeps the gas temperature down. It must be remembered that even with the full automatic producers, hand attendance is necessary to keep the fire bed uniform by hand working.

To date, no better method of air-steam control has been secured than control by the bugle temperature. If more gas is needed, more air, more steam and more fuel are necessary. Should only the fuel supply be increased, the percentage of carbon in the ash will be increased. Conversely, if less gas is desired, all three elements must be adjusted accordingly, or the gas will be diluted with excessive inerts, reducing the net fuel value of the gas in the furnace or process.

The greater the difference between the temperature of the hottest zone and the temperature of the gas without interference with the physical operation of the producer or excessive soot and tar accumulation in conduits, the more efficient is gasification. Fuel quality alone will not give best operation, but a good gas fuel with good attendance will give results close to the ideal. Gas having as high as 27% carbon monoxide and 4% carbon dioxide by volume is about the best that can be secured with Illinois coal; 22 to 24 percent carbon monoxide with 5 to 6.5 percent carbon dioxide represents a good average operation, but some Eastern coals give considerably better results. Hydrogen gives a nonluminous flame, while carbon monoxide gives a luminous flame and increases the heat transfer by radiation. The advantage of high carbon monoxide is, therefore, quite apparent.

(*Continued in October Issue*)

Some Observations on Japanning and Enameling

WILLIAM J. MISKELLA

Consulting Engineer on Finishes and Finishing Problems

EVERYONE interested in the gas industry need study only one single item which is used in every day life to realize what an enormous volume of business is being done in baked finishes, for that really is all japanning and enameling is. The term "enameling" has been thrown around and misused so much that it is difficult for some to know just what "japanning and enameling" do imply.

Folks talk of enameled sinks and enameled bath tubs. These are made of iron covered with a clay—baked at a very high heat—and then are called porcelain or glass enamel. Others speak of lacquer enamels which refer to colored pyroxylin lacquers.

However, the term japanning and enameling as they are to be used in connection with the subject of this article refers to baked finishing materials. Coating materials which are dried by placing the finished parts in a heated oven to accelerate the drying. Japanning refers to black baked finishing materials, and enameling to colored baked finishing materials.

And here attention should be called to the fact that chemical driers, such as are used to hasten the drying of paints and varnishes, are not used in colored baking enamels.

Definition of Japanning

And japan is somewhat in the same category. Really, it should be defined as a process of applying a mineral coating to metals—a coating that deteriorates less with age than any other known material that is applied in liquid form. It looks like paint and is often erroneously called paint. Paint is a coating material made up of pigment which gives it color, a drying oil which gives it life, and a reducer which conditions it so that it may be readily applied. The duration of the existence of a paint film rests with the life of the drying oil. When that ends the paint disintegrates and falls off. It "peels."

Japan also contains a drying oil but oxidation is accelerated while the articles coated with it are baking inside the japanning oven. The oven heat does not effect the pigment, which is a member of the asphalt family called gilsonite. The process consists simply of transferring a coating of mineral gilsonite from the mine to the surface of the article being baked. It is the heat in the japanning oven which causes the material—which remember is always black, but in a variety of black shades—to flow together in a beautiful smooth uniform coat. The result is the most durable and highly satisfactory metal coating in existence. Some examples are:—automobile fenders, adding machines, typewriters, etc.

Japan is the cheapest known metal finish, from the standpoint of cost, and is by far the most durable, not excepting nickel-plating, pyroxylin lacquer or spar varnish. Japan cannot be applied to wood or any material that will not stand being baked at a minimum of 325 degrees F. All materials that are applied and baked at temperatures below that temperature are NOT japans.

We might choose the automobile fenders as a good example of baked japan finish. In 1927 there were turned out 20,230,429 passenger automobiles, in the United States. Now! just multiply this figure by four and you would get approximately 81,000,000 fenders which were finished by the baked japanning process. Of course, it is true some of these were baked in electrically heated ovens but the great majority were baked in gas-heated ovens; ovens of all sizes and shapes, to fit every shop and every job.

When you stop to figure that automobile fenders are just one item of the thousands of parts that are turned out in industry, you realize the use of these large gas-consuming industrial equipment items is exceedingly large.

The daily shop routine of twenty years ago was to bake black-coated metal parts for at least four hours, regulating the open flame oven as well as one could without the use of any kind of a recording instrument. In those early days I was forced to stay in the shop many a night long after midnight waiting for one and sometimes all of the sixteen ovens, which we had in use at the time, to reach 350 degrees F. This was considered a very minimum point to reach before one could safely shut off the gas and leave for the night with the assurance that if the ovens were closed up tight and the heat held in them the loads would be, not properly, but passably baked the following morning.

The Watchman Regulator

It was the custom to spend the morning period, up to noon, in unloading the work which had been placed in the japanning ovens the previous afternoon. The workmen all left at five P.M. and the night watchman remained to "bake-off" the ovens. As a reward for close attention to his job he was allowed to go home whenever he succeeded in properly baking all of the ovens. Occasionally an oven would be found that was not baked hard enough. This would cause a serious delay the following day until the contents of that particular oven were again baked and carried through the cycle.

Very often when the condition of the atmosphere outside was close, the smoke from those sixteen ovens would not pass out through the small chimney that had an inside cross-sectional area of about thirty-two square inches. The result would be that the smoke fumes from this battery of japanning ovens would be so thick that one could not see a foot ahead.

In those days we went about our work mechanically

and did things because those who had gone before us had done them. We never wondered why such an effort had to be made to regulate the heat aside from the fact that we had been advised that was the proper procedure.

Times Have Changed

But now, we were not really as ignorant as we might appear to a user of the modern japanning equipment. In the first place we had a small gas intake from the street. The size of that used for our sixteen ovens was only two inches inside diameter. We might place two tons of castings in a single oven heated by means of two open-flame gas burners less than six feet in length. Obviously, it was impossible to get the heat of this mass up to 375 degrees F. with all the other fifteen ovens connected to the same gas supply. Naturally our only salvation was to "give all the gas" to the heavy load and get rid of it and then exert our energy on the remaining ovens.

A—Useful and Waste Heat in Oven With Average Insulation and Design; B—Same Oven with Best Insulation; C—Same Oven with Best Insulation and Best Design

After the heat was over the workmen had to go into the oven empty handed and carry out a few pieces at a time, on a rod or tray on which they had been baked. One can picture the loss of labor under such a system—we had no conveyors then. I will not easily forget the first conveyor I installed in my plant—and how all the workmen would walk around and wait to "see the oven pulled."

Today, instead of having men walk in and out of the oven carrying the work in small lots the entire load is carried in and out on an intermittent conveyor, a wheel truck or on a continuous conveyor.

We always had the awful feeling that "the plant was on fire." We knew that japanning ovens were dangerous and we watched every move that one made around them. Occasionally one blew up and took part of the building with it. We could only guess as to what was the real cause. Some thought the gas was the real cause while others thought the japanning materials was the cause. My own plant was burned to the ground twice in one year. Today we do not have to worry about explosions. There are safety doors on all modern japanning ovens, and few ovens are being built that are of the old direct-fired type. It was the old direct-fired type that earned the bad reputation for the japanning industry.

The Old Handicap

It was the small gas main that handicapped us in the olden days because we threw too great a load of ovens on it at once. Today we do not have to worry about baking-off the ovens nor is it necessary to have a night watchman to watch the ovens. Instead of trying to do all the baking at one time, from gas supplied through a small gas main, we bake the ovens as fast as they are filled one at a time during the day with gas supplied through a large gas main. The load is uniformly distributed throughout the day.

OVEN DATA DESIRED

*1. Baking process (as japanning, etc.)
*2. Color
*3. Maximum temperature desired
*4. Length of each bake
*5. Hours oven is operated per day
*6. How many (coats or) bakes does work receive?
7. How is finish to be applied (as dipped, sprayed, brushed, or flowed)?
*8. Product to be baked
*9. Material of which the product is made
*10. Overall dimensions average parts
*11. Average number of parts per bake
12. What limits the baking temperature (solder, wood, glue or what)?
*13. Weight of average part
*14. Total weight of metal per oven compartment in the parts for handling work
15. Describe present method of doing work
*16. Method of handling work: (as truck, lift rack, conveyor, etc.)
*17. Overall dimensions of loaded truck or rack, etc.
.....wide.....long.....high.
18. Distance from floor to lowest part of work
19. If trucks or car, distance between wheel centers (gauge), etc.
.....and width of wheel faces
*20. If work is trayed; size tray
*21. Number of layers high in oven
22. If work permits "nesting" as in hollow open parts, give distance between centers: Across oven
Along oven depth
In height
*23. Number of trucks per compartment
*24. Number of compartments desired (sketch floor plan showing arrangement)
25. Swing of lift doors
*26. Doors, one or both ends
27. Are walls to be 2 inches or 4 inches thick?
*28. If you have determined it, give the net baking space required for an oven load
.....wide.....deep.....high
29. Natural or mechanical draft
30. If latter, kind of current for motor
*31. Method of heating preferred
*32. If electric, name the make of heaters (if preference):
Voltage of current.....DC—AC
If latter, cycles and phases (1, 2, 3)
*33. If gas, kind.....Pressure
*34. If steam, pressure at oven
35. On which floor will oven be located?
36. Net ceiling height
37. Number of stories in building
38. Material of floor where oven is located
*39. Floor space available
40. Height of adjoining buildings
41. Where possible, send building plans and indicate where oven is to be installed.
Designate other items wanted below:
Oil burners
Steam coils
Automatic temperature control
Recording thermometer
Conveyors
Trucks or lift rack, and number
Lift trucks, and number
Dip tanks
Drain boards
Gas booster
Outside vents (give sketch, showing dimensions and nature of run)

* Important Data.

Usual Points to be Considered when Purchasing a Japanning Installation

Then too, modern ovens are equipped with regulation devices and recording thermometers which automatically draw the curve we used to try to approximate by guess work. Today we even have electric exhaust fans to take away the smoke fumes so that modern japanners hardly know there were "once upon a time" gas fumes to contend with.

One day I stood watching the operation of our big intermittent conveyor and I could not help but marvel at the remarkable changes that have taken place within the last twenty years. There was hanging on the conveyor a load of 160 automobile bumper bars ready to enter the oven as soon as the doors at the two ends opened. Inside the oven another 160 bumper bars were baking and on the opposite end of the oven was still another load of the same number being unloaded. So, hanging on

the conveyor, therefore, just as the oven was about to be "pulled," were 4,800 pounds of bars all of which would be baked, unloaded and in the shipping room in less than one hour.

The quality of the finish has been greatly improved by the modern japanning ovens, the pre-heat ovens and the continuous conveyor ovens. The continuous uniform results that modern improvements enable us to secure could not in any way have been equaled by the early japanner.

Tests of baked japanned articles may be made as severe as possible—if the japan finish is applied to a properly cleaned surface with the proper kind of finishing materials and is baked properly.

The following specifications of the Department of Electricity of the City of Chicago covers ordinary metal conduit used for protecting electric wires. This item is found in almost every house and building in the land. (The word "enamel" has been changed to "japan," the proper term.):—

All surfaces of the tube must be protected against corrosion by one of the following or some other approved methods:

The japan coating on either the inside or the outside surface of the finished conduit must not soften at ordinary temperatures. It must have an even and smooth appearance and must be of a uniform quality at all points of the length of the tube. It must be of sufficient weight and toughness to resist smashing or flaking at any time up to one year from the year of manufacture when one-half inch conduit is bent in a curve, the inner edge of which has a radius of three and one-half inches.

The japan coating must not be seriously affected by soaking at 70 degrees F. for twenty-four hours in any of the following aqueous solutions:—

1. Sulphuric acid of 1.3 specific gravity containing 40% by weight of anhydrous sulphuric acid.

2. Commercial strong hydrochloric acid containing 20% by weight of anhydrous hydrochloric acid.

3. Acetic acid containing 20% by weight of anhydrous acetic acid.

4. Saturated solution of carbonate of soda, containing 20% by weight of anhydrous carbonate of soda.

From this it is evident that the specifications covering good japanning are very rigid. But it is just as easy to meet them and do good work as it is to do the reverse.

New uses for this most valuable baked finish include the protection of steam and hot water radiators. Instead of forcing the paint contractor to do an extra cleaning operation to remove the rust from the unfinished product, the manufacturers are now baking a protecting coat on radiators before shipping. No more, therefore, will we see piles of rusty castiron parts in front of new buildings.

Another interesting development is the finish of automobile rims. Experience has demonstrated that galvanized rims rust when the tire flap comes in contact with the periphery of the rim. Research discovered that a galvanized rim with a baked-japan finish on it did not rust. That evolved the thought of cutting automobile cost by omitting the tire flap. Further investigation suggested the omission of the galvanized coat. Thus, baked-japan finishing is responsible for eliminating flaps from automobile tires.

Along with all these improvements have come remarkable improvements in japanning ovens; also washing machines, heated by gas; pre-heat ovens in which the parts to be finished are either dried after the washing or heated so as to shorten the time of baking; the burn-off ovens in which old finishes are removed as also oils or greases, and numerous other equipment wherein gas is generally used.

Sh-h-h!!

"QUIET as a roving cloud," and "As inaudible as a butterfly poised on white dandelion down lulled in the calm of a peaceful summer stillness," are the two prize-winning metaphors submitted by customers of the Consolidated Gas Company of New York and affiliated gas companies in a special contest recently conducted to secure metaphors to describe the silent operation of the gas refrigerator.

The contest was conducted solely through *Greater Service News*, the company's magazine for customers. More than seventy metaphors were received, the two quoted above being selected by a special committee to receive cash awards of five dollars each.

The contest started with the printing of the following metaphor for silence as written by Dr. Seuss and published in *Judge*. "That piquant noiselessness that emanates from a picture-wire supporting the portrait of a billiard ball nestling in a basket of wool." The original announcement of the contest was made in the June issue of *Greater Service News*, and the awards were announced in the August issue. Metaphors were submitted from all sections of the company's territory, and a few came from outside. New Jersey was represented, and Missouri, also.

The following metaphors were considered worthy of honorable mention in the contest:

"Snowflakes falling on a bed of cotton"

"As silent as the birth of an idea in the brain of a love-sick swain"

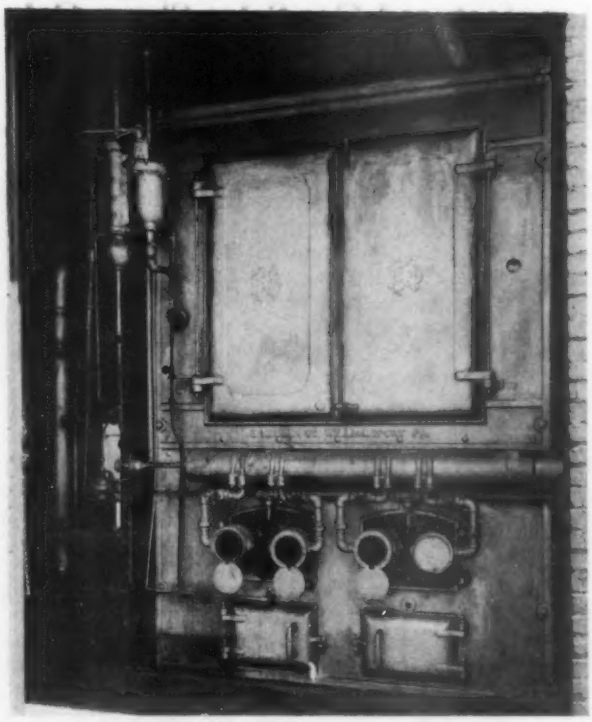
"As silent as nothing dropping into nowhere."

"It is the down of ripe thistles,
The down from the breast of swift wild ducks,
Floating, soft, silent missiles,
The power that moves the Electrolux"

"As silent as a collar-button under a bureau"

The most popular contribution of all was "As silent as the Sphinx," although the influence of the Byrd expeditions was seen in many entries, such as "As noiseless as the fall of a snowflake in Little America," and "As cold and silent as the great Antarctic."

The committee of judges for the contest made no attempt to ascertain the sex of the persons sending in the following metaphors: "As silent as a husband after his wife has won an argument," and "That stillness which the clubman hopes to achieve in the early morning when returning to his easily awakened spouse." Of course, the usual number of contributions called attention to the silence of sunshine, falling snow, and cats after mice.



Gas Fired Boiler For Asphalt Handling

J. B. NEALEY

American Gas Association

IN preparing asphalt for surfacing roads steam lends itself admirably for melting, mixing and handling at the plant. In the city of Pittsburgh, Pa. gas fuel is used under the boiler at the Municipal plant No. 2 instead of coal, in spite of the fact that the latter is available at $2.70 per ton delivered. With gas at 45 cents per 1000 cu. ft. it has been found to be cheaper than coal. It eliminates four firemen and the necessary laborers for coal and ash handling while the storage space for coal and ashes is available for this purpose.

Above—Gas-fired Steam Boiler From Which Plant Is Operated

Right—General View of Asphalt Plant.

Below—Gas-fired Rotary Sand Dryers. Note Bucket Elevators for Raising and Charging Sand Into Retorts.

The Pittsburgh asphalt plant No. 2 furnishes, on an average, 150,000 sq. yds. of 3 in. asphalt surface in eight months. This is usually composed of 1½ in. of binder consisting of asphalt, sand and slag and 1½ in. of top composed of asphalt, sand and lime. The average cost is $1.66 per sq. yd. including overhead and depreciation of plant and equipment, etc.

Cars of asphalt are spotted on a railroad siding close to a pump house and a steam line is attached to the steam coils in the car and steam admitted. It requires from 6 to 12 hours to soften up the asphalt. A steam jacketed flexible hose is then attached to a bottom outlet in the car and suction applied with a steam pump which draws the asphalt through the hose, thence through a strainer in the pump house and on up into the storage tanks. There are two steel storage tanks of 80 tons capacity each, and it requires only 60 minutes to unload a 40 ton car.

A steam crane with a grab bucket, operating on a parallel track, is used to unload sand, slag, lime etc. which is stored in piles on the opposite side. The lime dust however, comes in bags and this is taken by an elevator conveyor up into a storage bin holding 40 bags. In fact all of the ingredients are held in elevated storage bins and dropped by gravity directly into the mixers.

The sand is first dried in a revolving steel drum enclosed by a brick furnace. The drum, which is water operated, is 26 ft. long and 5 ft. in diameter and makes 6½ revolutions per minute. It sets at a slight angle so that the sand works through and discharges automatically. Heat is supplied by four atmospheric gas burners, and the temperature is maintained at 500 degrees F. with the aid of a recording pyrometer. The capacity of this dryer is 40 tons hourly. The sand discharges into a chute which protrudes through the side of the furnace wall and directs the sand into a bucket elevator. This lifts it and drops it through a screen into a storage bin. Another dryer, identical to the one described, is used for drying the stone or slag.

Batches of 1500 pounds each are made up by drawing the sand, slag and lime from storage into weighing hoppers and the asphalt into buckets holding the correct amount. These ingredients are then dropped into the mixers. The asphalt tanks are equipped with steam coils and when ready to use the steam is turned on and the asphalt melted, 330 deg. F. being the flowing temperature. Compressed air from a steam operated compressor is admitted to the tanks through pipes and this forces the liquid asphalt out into the buckets.

The usual 1500 pound batch for the top coat will contain 150 lbs. of asphalt, 270 lbs. of lime dust and 1080 lbs. of sand. There are other mixtures but this is the one most commonly used. The sand is used out of storage as soon after coming from the dryer as possible so as to preserve the heat but the lime dust is dumped in cold. These are weighed out in the weighing hopper and then dumped into the mixer with the asphalt.

There are two mixers built of steel plate about 5 ft. square and 3 ft. deep. They are jacketed so that steam can be admitted to keep the mixer up to temperature, about 500 deg. F. equipped with two sets of heavy steel paddles on shafts. A 30 horse power motor operates both. The batches are dropped into motor trucks, holding about 9000 lbs. each, at a temperature range of 350 to 375 deg. F. and are distributed within an average radius of 12 miles. From 10 to 12 trucks are thus employed.

The steam supply of this plant is furnished by a steam boiler of 150 horse power capacity, which is fired with gas burners. This installation is of the Horizontal Return Tubular Suspension Boiler type fired with coal. However, for the sake of economy, gas burners were later provided and gas fuel has been used ever since.

The boiler is 72 in. in diameter and 16 ft. long and it is 52 in. from the floor level to the underside of the shell as shown in the side elevation. The burners are set in a firebrick wall which blocks the fire door opening. There are four of these burners and they are manifolded to a single header. All metal surfaces exposed to the heat are protected with a refractory material excepting only the water lined surfaces.

As air must be admitted and premixed with the gas in a predetermined ratio for perfect and complete combustion, the firebox is sealed airtight. The admission of air is provided for in the burners themselves through an adjustable shutter at one end of the burner mixing chamber. Gas is admitted to this mixing chamber through a series of small perforations, and the quantity is regulated by means of three regulating control valves. In addition to the economies effected through the use of gas fuel already mentioned, it is of interest to note that in the 15 years of service this boiler has undergone only once has it been necessary to change the tubes.

Manufactured Gas Sales Show Gain For First Six Months

MIXED trends, characterized the gas industry during the first six months of the current year. Reports received by the Statistical Department of the American Gas Association from companies representing 90 per cent of the manufactured gas industry indicate an increase of 2 per cent in manufactured gas sales and 1.4 per cent in revenue in the first half year as compared with the corresponding period of 1929, while reports from companies representing 70 per cent of the natural gas utility industry show a decline of 4.8 per cent in natural gas sales and a drop of 4.2 per cent in revenue for the same period.

Depressed conditions in industry and general business have retarded the rate of growth of the gas utility industry. This is clearly shown by comparing the growth registered in previous years. For the year 1929 manufactured gas sales were 8 per cent above 1928, while natural gas production showed an unusually large increase of approximately 20 per cent.

In both manufactured and natural gas divisions of the industry substantial declines were registered in industrial-commercial sales. However, manufactured gas companies offset the decline in this class of business by substantial increases in househeating sales.

The relatively "depression proof" characteristic of the gas industry is indicated by operating results during the first six months of the present year. While manufactured gas sales showed an increase of 2 per cent and natural gas sales showed a decrease of less than 5 per cent, bituminous coal production decreased 9 per cent, coke production dropped 10 per cent, crude petroleum output decreased 5 per cent, pig iron production decreased 16 per cent, steel ingot production 21 per cent, automobile production 32 per cent and freight car loadings 9 per cent. Electric power production showed practically the same gain as manufactured gas, namely 1.7 per cent.

During the first half year substantial progress was shown by gas companies in New England, the West North Central States, and the South Central and Mountain States. In New England, despite a drop of 7.7 per cent in industrial-commercial sales total sales increased 4.6 per cent due to an increase in domestic sales and a 37.9 per cent gain in househeating sales.

In Michigan, where gas sales are considerably affected by the rate of activity in the automobile industry, sales for the first six months registered a decline of 2.3 per cent due to a decrease of 9.3 per cent in industrial-commercial sales, which offset a 21.9 per cent increase in househeating sales.

Both manufactured and natural gas divisions of the industry showed very slight improvement in June as compared with May. In May, manufactured gas sales were 1.0 per cent below May, 1929, while June sales were at practically the same level as a year ago, showing a drop of only 0.1 per cent. In May, natural gas sales were down 11.0 per cent and in June 10.7 per cent as compared with the corresponding month of 1929. It is interesting to note that production of electric light and power during May and June as reported by the U. S. Geological Survey shows a similar condition. In May electric power production was down 0.9 per cent, while in June the drop was only 0.3 per cent as compared with June, 1929.

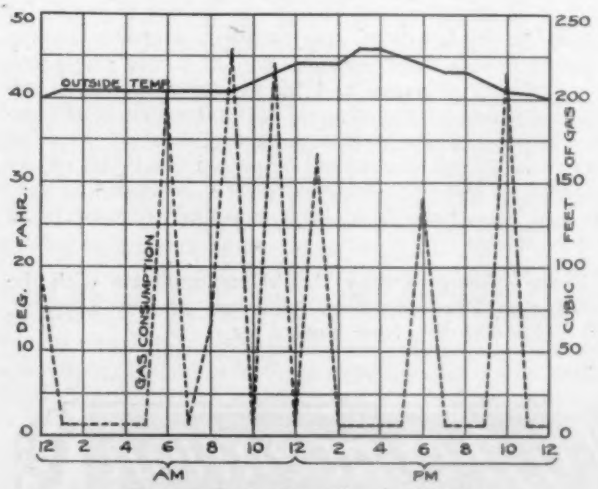
Home and Gas-fired Installation for Heating in Winter and Cooling in Summer

Year 'Round Comfort

SPECIAL CORRESPONDENT

THE furnace installation in the home of Mr. W. E. Derwent at Rockford, Illinois, is of interest from two standpoints; first, it belies the oft-repeated assertion that the gas man is loath to down a draught of his own medicine, and second, the installation, while used primarily for heating Mr. Derwent's home in winter, is also pressed into service for cooling in summer.

The furnace which is manufactured by Geo. D. Roper Corporation, is of the warm air type and employs a power driven fan for the throughput of air to be heated. In addition, there is provided an automatic humidifier which maintains the humidity at about 35 per cent. Thermostatic control is also used in conjunction with the equipment.



Typical Day's Operation in Winter

This home has a cubic contents of 12,000 cubic feet and a heat loss of 102,000 B. t. u. per hour, at minimum temperature. In order to maintain a temperature of seventy degrees inside it was found necessary to burn 394,300 cubic feet of gas. This figure was below the estimated amount of 415,000 cubic feet and the winter of 1929-30 was about average for this section of the country. The average flow of air through the furnace was 1480 cubic feet per minute and, when operating at full load, an average register temperature of 136 degrees Fahr. obtained.

The chart shown on this page gives the variation in outside temperature and the gas consumption for twenty four hours on November 14, 1929. Additional data applying to this chart are as follows:

Average Indoor Temp. (day)	73
Average Indoor Temp. (night)	61
Weather	Clear
Average Outside Temp.	42.3
Total Gas Used	1501 cu. ft.
Max. Hourly Demand	230 cu. ft.
Average Temp. Difference	26.5
Gas per Degree Difference	56.6 cu ft.
B. t. u. per Degree Difference	32,000
B. t. u. per hour per Degree	1340

From the standpoint of cooling in summer the fan was operated and fresh air delivered to the various rooms. A cooling effect of ten degrees was experienced when the outside temperature was ninety degrees. However, the windows and doors had to be kept closed in order to ensure the best cooling condition. Incidentally, by using the system in this manner it was found feasible to dispense with electric fans in the various rooms. Particularly as regards the operation of the equipment in summer, it is interesting to speculate on the cooling effect that would be obtained if the house in question were insulated.

Cracking Natural Gas in Water-Gas Generators

NATURAL gas can be cracked in a water-gas generator by making alternate air blasts and gas runs. The resultant gas is comprised largely of hydrogen.

The gas produced may be used as follows:

(a) Mixed in small percentage with natural gas and used in place of the latter.

(b) Carbureted and mixed in small percentage with natural gas or used straight as manufactured gas for city distribution.

(c) Mixed with natural and water gas, with varying amounts of blow-run gas (varying under control) and distributed as city gas. In this manner a mixed gas can be made which can be mixed with coal gas in almost all proportions and used in common burners without making burner adjustments.

(d) Used as a source of hydrogen for making synthetic materials such as ammonia or for other industrial purposes.

(e) Used mixed with water gas in amounts required to give the Co: H_2 ratio desired in making methanol or other products.

Carbon black can be recovered in making the hydrogen gas, in amounts approximating 7 pounds per 1000 cubic feet of natural gas cracked.

It is believed that the carbon black recovered will have a value of 3 to 7 cents per pound, although such a value has not yet been established.

The amount of solid fuel used in the process chargeable to the cracking operation is less when some water gas is made than when making only alternate air blasts and gas runs. This is true whether the water gas is made simultaneously with the cracked gas or in alternate straight water-gas runs.

A large amount of generator fuel was used in the tests in cracking natural gas by making alternate air blasts and gas runs. It is recognized that with continuous operation (the tests were of short duration), improvements in operating technique, and possibly some changes in procedure, the amount of fuel required for cracking a unit volume of natural gas might be materially reduced.

The process is worthy of further study and, if a reasonably high price can be obtained for the carbon black, it should be developed. *—Dept. of Commerce, Bureau of Mines, R. I. 2991.*

Valuable Publication on Meters and Meter Testing

GASMEN interested in meters will welcome the volume, *Positive Displacement Meters,* recently published by American Meter Company. Although one of the oldest pieces of apparatus in the Gas Industry, there is still much to be learned about the operation and maintenance of the gas meter. The volume in question will go a long way toward imparting such information to those who will painstakingly study its text; and this should be a none too difficult task, what with the interesting and concise manner in which the subject is presented.

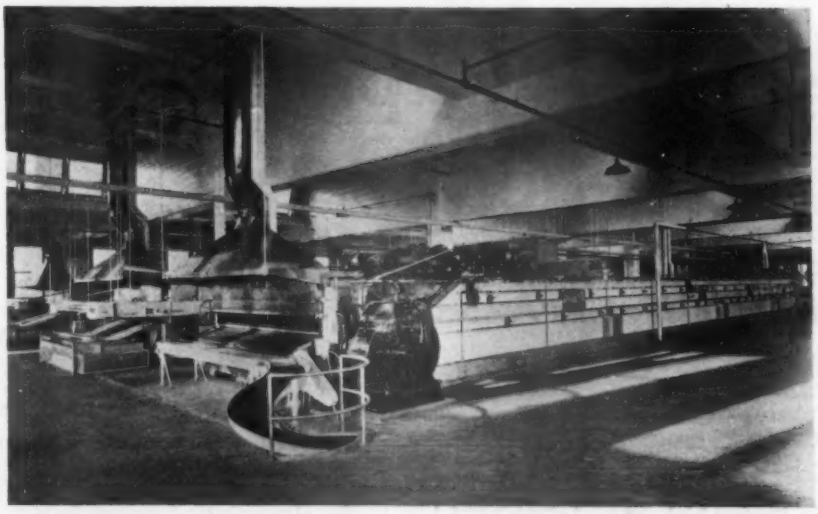
The book starts off with a brief history of gas meters, their improvement from time to time, and a discussion of the principles of gas measurement and the general requirements of meters. Then follows a rather complete chapter having to do with the physical properties of gases in general. This portion of the book which is replete with useful tables, also contains a number of illustrations which are both informative and very clearly reproduced. As a matter of fact, the illustrations throughout the entire book have evidently been selected by men who realize that an illustration should tell something and not be abstruse and complicated.

The characteristics and operation of tin steel-case and cast iron meters are next treated, after which the measurement of gases at high pressure and vacuum is discussed. Later appear chapters dealing with the proving and testing of meters, together with a complete description of the apparatus and instruments used, and the repair of meters. In every chapter valuable charts and tabulations are to be found.

This volume should be on the desk of every superintendent of meter repairs; also, it would not be amiss for it to be in the hands of every student who is pursuing a course in Gas Engineering as well as Cadet Engineers. It contains 206 pages and 90 illustrations and is refreshingly free of the advertising slant which is so common in publications of this character; in short, it is the kind of handbook that would be gotten out by those exclusively in the publishing business. Needless to say, the book's contents have been compiled by experts in meter matters.

Those desiring a copy should communicate with the Publication Department of American Meter Company, 105 West 40th St., New York City.

Plan to Attend the A·G·A·Convention



Automatic and Continuous Gas-fired Bake Ovens Having a Combined Capacity of 12,000 Loaves Per Hour

American Gas Association Issues Important Treatise On Bread Baking

THE American Gas Association has recently issued a brochure on bread baking which should prove of considerable value to gas companies and baking establishments alike. This appears under the title, "The Application of Heat to Bread Baking," and represents a complete report covering the two and one-half years' work conducted at the American Institute of Baking, under the auspices of the Committee on Industrial Gas Research of the American Gas Association.

This research was undertaken for the specific purpose of determining the best method of heat application to the operation of bread baking and the part which fuel gas played in such application.

The work contains a detailed account of the various tests, as well as charts, data and the like that will be found immediately applicable in many territories served with gas.

A review of the results follows:

"1. Bread has been baked in two commercial traveling ovens in the same bakery from the same batch of dough, one oven heated mainly by radiation and the other mainly by convection. No appreciable differences in the external and internal characteristics of the resultant bread was noted.

2. Bread has been baked in an atmosphere of unburnt city gas. No adverse effect was detected as to flavor.

3. Bread has been baked simultaneously from the same batch of dough in three experimental ovens under conditions of control which at the time had not achieved a high degree of refinement, and notwithstanding the resulting bread showed similar characteristics with the exception of oven No. 1 which invariably showed a thicker crust formation. The reasons for this have been set forth. Repetition of these tests subsequently under conditions of close control, developed in the course of the research, duplicated the above results.

4. Results obtained from the earlier experiments indicated an apparently greater shrinkage loss in the convected heat oven as compared with the low temperature radiant heat oven. This discrepancy was demonstrated as being due to the underbaking of the sides of the intermediate loaves in the pan strap in the radiant heat oven. Increasing the pan spacing in this oven resulted in a shrinkage loss equivalent to that in the convected heat oven.

5. In the course of this investigation an instrument was devised for the purpose of rapidly determining the degree to which bread had been baked. This instrument called the "Penetrometer" has made possible a convenient standard of reference necessary to the successful prosecution of this research. It may have possibilities of application in commercial baking control."

In concluding the following are noted:

"1. The best method of heat application for bread baking can be achieved through either low temperature radiation, or convection, or a combination of the two.

2. Gas can be applied equally as well through low temperature radiation, or convection or a combination of the two.

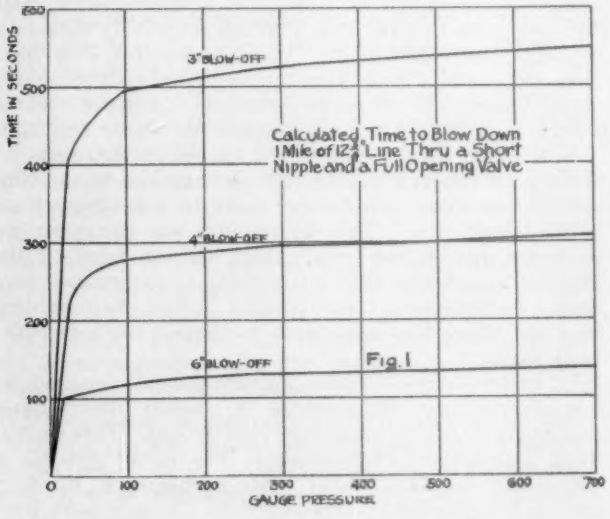
3. The choice rests largely on the economies and engineering of oven design combined with the economics of the available fuels."

The Design and Capacities of Bleeders

Report of Sub-Committee on Transmission Pipe Lines, Pacific Gas Association

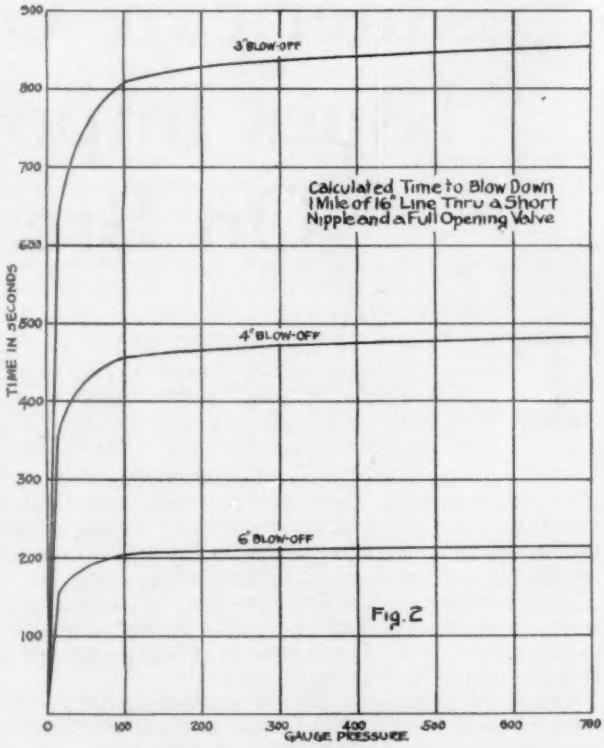
THE design of bleeders or blow-offs has been well covered in the committee report on Natural Gas Transmission Lines in the Proceedings of the Pacific Coast Gas Association, Volume 20, 1929 Page 394.

No literature seems to be available from which one may compute the time required to blow down a known volume of gas to the atmosphere through an orifice. Many engineers' handbooks give formulae for finding the time required to empty a tank of liquid through a short tube or orifice, but it was found that these formulae were not applicable to compressible fluids, and the committee conducted a series of experiments to determine the required time to blow down a known volum through different sized bleeders, and from various initial pressures. A container made of several joints of large diameter pipe welded together was constructed, and the cubical contents carefully computed. Various sized bleeders of small size were then welded to this container. The diameter of these bleeders was carefully measured.



This container was installed at a location where high pressure gas was available, and it was blown down to atmospheric pressure from various pressures as high as 275 pounds, and the time taken to blow it down was carefully noted. A recording pressure gauge with a 30 minute clock was also installed to determine the type of curve on these tests. The recording pressure gauge in all the experimental and check tests was located about three feet from the blow-off. A formula was then developed, and tests were run on eight, twelve, and sixteen inch lines, and the results obtained were checked very closely with the results obtained on the test set-up.

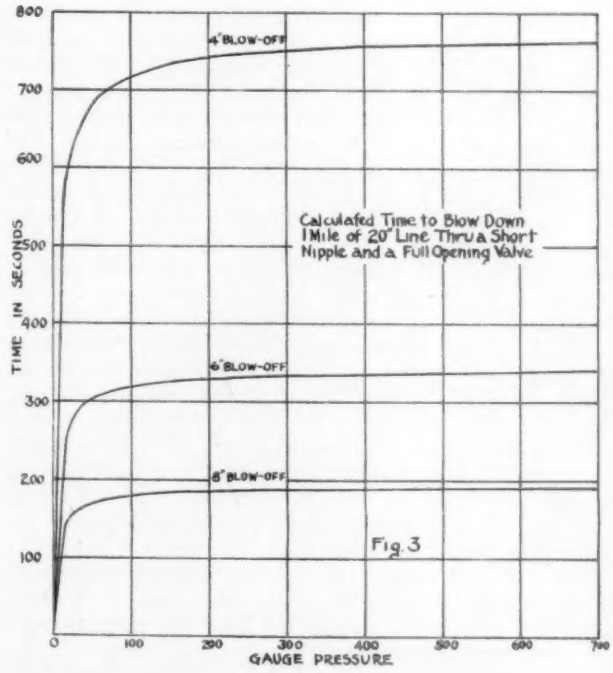
A series of curves was then prepared showing the length of time required to blow down one mile of different sized line to the atmosphere from various pressures through different sized bleeders.



These curves, Figures 1 to 5, have been calculated, based on the results of these tests, and the time shown is based on the bleeder consisting only of a short nipple whose length is twice its diameter, and a full opening gate valve. However, in practice, this condition is usually impossible, and a line is blown down through a valve and a section of pipe, and sometimes several fittings. Tests indicate that the actual time required under practical conditions to blow down lines is about 66⅔% greater than is shown on the curves.

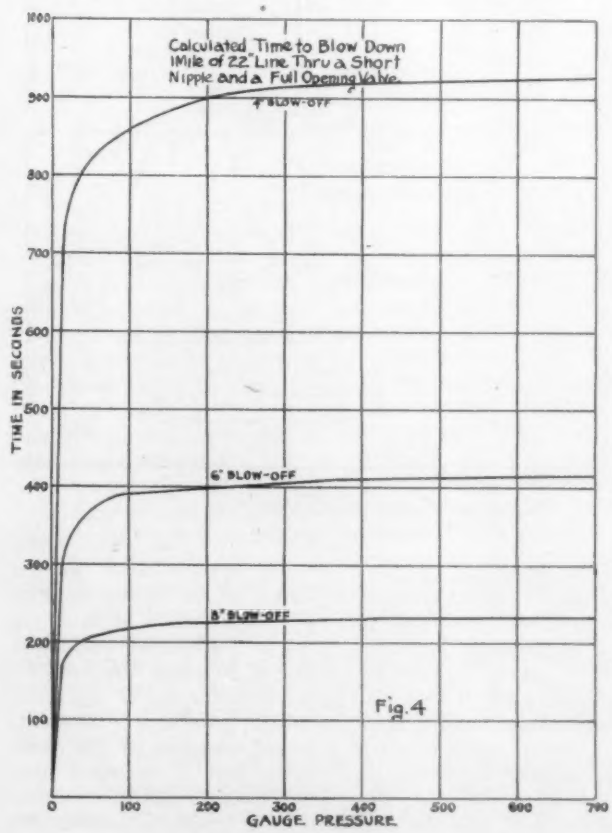
The time shown on these curves is also based on instantaneous opening of the blow-off valve on the bleeder. This is physically impossible, and sometimes it is not advisable to open the valve wide, even after the pressure has dropped to such an extent that this is possible.

Presented at Meeting of Pacific Gas Assn. Pasadena, Cal., Sept. 9-12, 1930.


4" BLOW-OFF
6" BLOW-OFF
8" BLOW-OFF
Calculated Time to Blow Down 1 Mile of 20" Line Thru a Short Nipple and a Full Opening Valve
TIME IN SECONDS
GAUGE PRESSURE
Fig. 3

When using these curves, this must be taken into consideration in estimating the time necessary to blow down lines, and it must also be remembered that at best, these curves can only be approximate, as the temperature of the gas and its specific gravity also affect the time to a certain extent. The curves are based on tests made with natural gas having a specific gravity of about 0.70, and a temperature of 70 degrees Fahr.

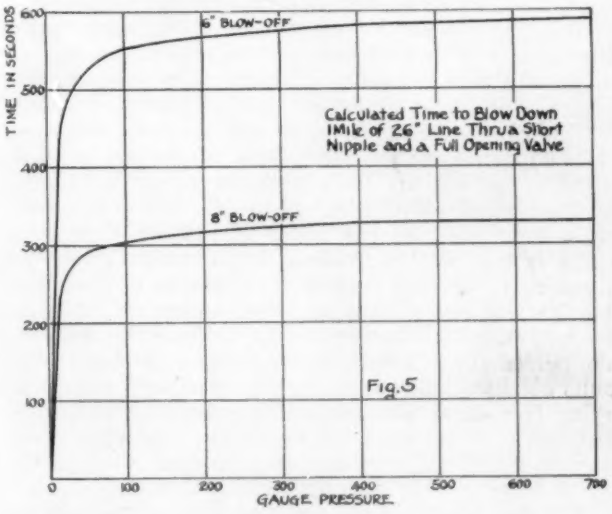
On several tests the temperature of the pipeline was noted during the blow down, and no appreciable temperature change was noticeable.


Calculated Time to Blow Down 1 Mile of 22" Line Thru a Short Nipple and a Full Opening Valve
4" BLOW-OFF
6" BLOW-OFF
8" BLOW-OFF
TIME IN SECONDS
GAUGE PRESSURE
Fig. 4

It was further noted that on several tests where the line was blown down through Venturi Type Valves, the required time was 100% greater than the time shown on the curves. It is recommended that on blow-offs, full opening valves be used.

During the meetings and discussions of this committee, several subjects were brought out that should be mentioned, and while no work was done on these subjects, the committee feels that they are worthy of further investigation, and recommends that they be studied by the in-coming committee.

In the February, 1930 issue of *Western Gas*, Mr. P. M. Biddison, in an article entitled "Natural Gas for the South through a 909 Mile Carrier," gives the following formula for the thrust at bends:


6" BLOW-OFF
8" BLOW-OFF
Calculated Time to Blow Down 1 Mile of 26" Line Thru a Short Nipple and a Full Opening Valve
TIME IN SECONDS
GAUGE PRESSURE
Fig. 5

Thrust = P x D^2 x .7854 x 2 x Sine ½ Angle of Deflection in which

P = Pressure in pounds per square inch

D = Diameter of Pipeline

In welded pipelines, this thrust is not of serious consequence, but in coupled lines, and in welded pipelines if couplings or sleeves are used near overbreaks or horizontal angles, it is important that the line be properly anchored or braced.

In the case of a 20" line under 400 pounds, this thrust becomes approximately 63,000 pounds for an angle of deflection of 30 degrees. It is obvious that a loose backfill at an overbreak is not sufficient unless the line is laid at an exceptional depth, and that anchorage or thrust blocks of some sort must be provided if the angle is at an overbreak.

At horizontal angles, blocking or thrust blocks should be provided, and the loose backfill should not be depended on to resist this thrust.

Welding

Considerable time was devoted to the discussion of welding and welding costs. Much of the new pipeline work is being done by the electric arc process, and new processes and technique have been developed for acetylene welding. This committee suggests that a committee be appointed for the ensuing year to make a study of welding methods and procedures, both acetylene and electric, and also develop if possible, the relative costs of these two methods.

Removal of Impurities from Natural Gas

THE removal of impurities from natural gas before it reaches the distribution system is an important factor in the natural gas business, and failure to accomplish this may cause untold trouble.

Unfortunately, this committee was unable to complete its work on this subject, however, a progress report of the work done to date follows:

Since by far the greater portion of the "so-called" dry gas used on the Pacific Coast is casinghead gas from which the commercial hydro-carbons have been extracted by various processes, the committee felt that the extraction of solid impurities was of minor importance, and all studies were devoted to the removal of liquid impurities. Until recently, very little thought has been given to locations and capacities of main line drips, and such drips were usually designed, using the principle of decreased velocity and change of direction.

This committee hoped to be able to make investigations to determine the efficiencies of various types of drips under various pressure and volume conditions, and set about developing means of determining the moisture content of gas under flowing conditions. A great deal of work was done by the committee, in attempting to develop a satisfactory means of determining the moisture content of flowing gas. Several known methods are entirely satisfactory in determining the percentage of saturation of flowing gas, but the results obtained when applying these methods to gas carrying free water were absolutely unreliable and inconsistent.

Drying Tube Method

The first method tried in attempting to discover the efficiency of various types of drips was the drying tube method. In all of these tests there were two complete outfits which made it possible to determine the condition of the gas on each side of the drip simultaneously.

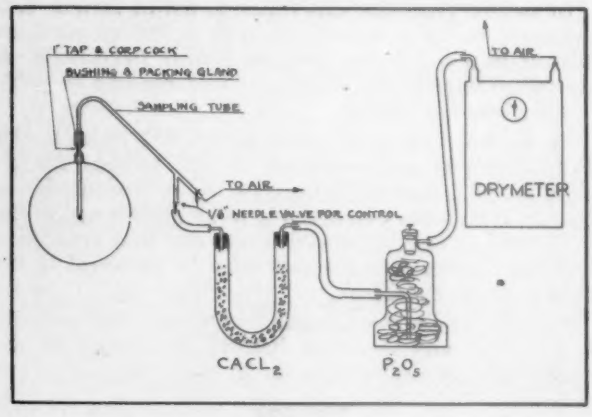


Figure 1

In Figure No. 1 is shown the apparatus of the drying tube method which consisted of a 5/16" O.D. sampling tube, a "U" tube filled with calcium chloride, a tube filled with glass wool and phosphorous pentoxide, and a positive dry test meter with a dial graduated to 1/10 of a cubic foot.

Presented at Meeting of Pacific Gas Assn., Pasadena, Cal., Sept. 9-12, 1930.

The sampling tube made of seamless steel tubing was closed at the end which was introduced into the line except for a hole in its side which could be placed against the flow of gas in the line. This tube was introduced into the line through one inch corporation cocks by a special bushing and packing gland. The sampling tube forked at the other end, allowed the drying tubes of $C_a\ Cl_2$ and $P_2\ O_5$ to be connected to one of the branches as shown in Figure No. 1. The other branch was opened to the air sufficiently to cause a velocity through the sampling tube as great or greater than that in the line itself. The control valve on the branch was then opened sufficiently to allow about 12 cu. ft. per hour to pass through the drying tubes; the gas being measured after it passed through the drying tubes. When 4 or 5 cu. ft. had passed through the drying tubes, they were weighed, having been weighed before the test started, the difference in weight was the amount of water absorbed from the measured amount of gas, and by use of the formula on Page 377-78 of Vol. No. 18 of Proceedings of Pacific Gas Ass'n., the percentage might be determined.

The principal reason this method was discarded was in the sampling. The test only made use of a small part of the gas drawn from the line. In passing over the sharp bend above the pipe, water was condensed out by restriction. This water fell into the drying tubes, thus giving a false reading.

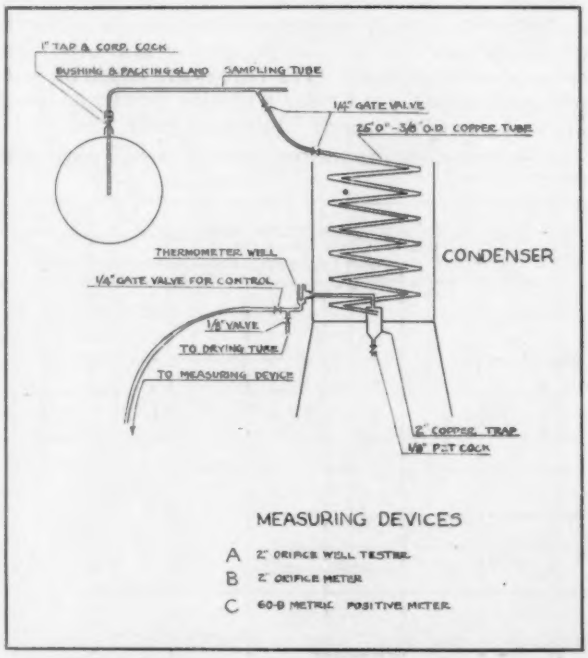


Figure 2

In Figure No. 2 is shown the apparatus of the condenser method, which consisted of the sampling tube, condenser (a coil of 3/8" O.D. copper tube with a trap in the bottom immersed in an ice bath), and the measuring device. Also a connection to allow the use of a drying tube of $P_2\ O_5$ to be sure all the water above the saturation was being removed. The idea of this method being to make use of a larger quantity of gas under conditions similar to those in the line in regard to pressure and velocity. One of the reasons this method was discarded, was the difficulty in obtaining a satisfactory method of measuring the amount of a gas (from 100

cu. ft. to 1000 cu. ft. per hour) with any degree of accuracy.

The first measuring device used was the 2″ orifice well tester. This was found unsatisfactory because it would neither check against itself nor against a master meter.

The second measuring device was the 2″ orifice meter. This meter magnified the known sources of error of the orifice meter to such an extent as to be as much as 20% in error on 100 cu. ft.

The third measuring device, a 60-B Metric Positive Meter, was satisfactory as to accuracy, but unsatisfactory in the fact that it was very cumbersome.

The condensers made of 25′ 0″ of ⅜″ O.D. copper tubing coiled in an 8″ coil 20″ long and placed in a 10″ cylinder as shown in sketch, proved unsatisfactory also. The reason, while built exactly the same, having same volume of gas passing through, same temperature of ice bath at the same time, the amount of water removed would not be the same, which was probably due to the method of draining off the sample from the main line. The method of determining the percentage was the same as in the first method.

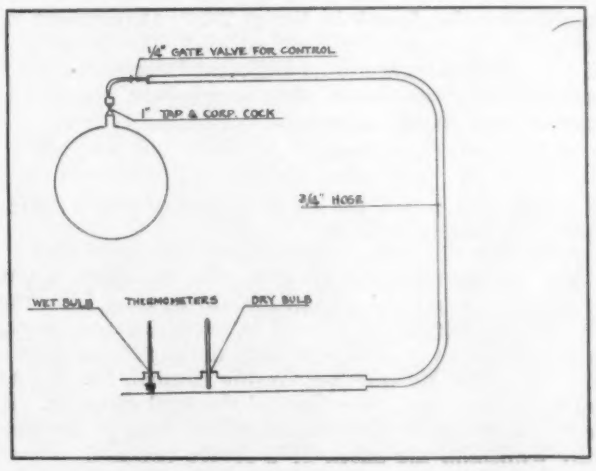


Figure 3

The third method used is shown in Figure No. 3, and is known as the wet and dry bulb method. The gas was taken from the line and allowed to expand from the ¼″ control valve into a 2″ expansion chamber, at approximately atmospheric pressure, where is passed first a dry bulb thermometer, then a wet bulb thermometer about 4″ downstream. The relative humidity was determined by difference in the usual method, as used with a sling psychrometer, and calculated back to the line conditions.

The principal reason for discarding this method was variance in results under the same conditions as the amount of gas through the instrument was varied.

These inconsistencies, the committee feels, were all due to the method of sampling; it being impossible to maintain the ratio of free water and gas taken out through the sampling tube the same as the ratio of free water and gas in the transmission line. The committee believes that much useful data can be obtained if a simple and accurate method of sampling the gas can be worked out.

From the study of this problem and usual observations during the experiments, the committee feels that a great deal more than principles involving change of directions and decreasing velocity is needed for the satisfactory removal of free liquid impurities carried along with natural gas. The committee feels that while it is essential that these principles be incorporated in any drip design, it is equally important that the incoming gas be divided into as many streams as possible while flowing through the drip, and that these streams be made to come in contact with as much surface as possible on which the free liquids may impinge. It is also important to make provisions for the removal of these particles of impinged liquids from the path of the flowing gas. Several scrubbers or drips now on the market are attempting to utilize these principles for liquid removal.

Location of Drips

It is doubtful if the proper thought has been given to the proper location of drips and scrubbers on transmission lines. Most of the gas delivered into transmission systems comes from gasoline extraction plants or compressor plants, and the temperature of the gas entering the system greatly influences the location and type of drip to be installed. It is the usual practice to install a substantial scrubber on the outlet side of these plants before the gas enters the transmission system, but if the gas is hot, the ability of the gas to hold moisture in the form of water vapor is greatly increased, and it is evident that as this gas cools, its ability to hold this water vapor decreases, and the water vapor will condense, and provision must be made somewhere along the transmission lines to remove this liquid.

When the gas temperature has reached the minimum ground temperature, no further condensation will take place, and it is recommended that a substantial drip be located near this point. It is not likely that much liquid will be removed beyond this point if adequate provisions have been made for its removal. Due to the decrease in pressure, the gas would probably pick up any water which passed the drip, and it would be carried along as water vapor.

The Committee does not recommend the point of minimum ground temperature as the ideal location for the most substantial drip investment on a transmission line, but mentions it merely as a fixing point beyond which drips or scrubbers are of doubtful value.

The ideal location for scrubbers would be at the outlet of gasoline or compressor plants with gas temperatures approximating the minimum ground temperature or dew point. However, it is usually impractical, and the expense unwarranted, to cool the gas to this temperature, and for this reason, main line drips are necessary. It is important that any liquid condensed be removed as soon as possible, as the pressure of liquid under certain conditions causes internal corrosion.

Hot Gas Should Be Avoided

The practice of delivering hot gas into the transmission systems cannot be condemned too strongly, as, in addition to possibly causing internal corrosion, the pressure of a large amount of water vapor, which later condenses, reduces the capacity of the pipeline system. Cases have also been noted where the protective coatings on pipelines have been ruined for a considerable distance from compressor plants, due to delivering gas into the transmission system at excessive temperatures.

It is impossible in this report to give data showing the temperature of the gas at various points along the pipeline, as this is dependent upon many variables. The following table shows the results of a test on a 12″ line in Southern California:

Test No.	Gas Temp. at Plant °F	Gas Temp. 3 Mi. frm. Plant °F	Gas Temp. 6.4 Mi.fr. Plant °F	Gas Temp. 8.1 Mi.fr. Plant °F	Gas Temp. 10.4 Mi.fr. Plant °F	Gas Temp. 12.5 Mi.fr. Plant °F	Volume Per 24 Hours M.C.F.
1	105	78	66				19,285
2	111	78	67				23,390
3	113	80	67				24,528
4	100	80	67				23,529
5	116	78		65			24,825
6	119	80		65			24,715
7	120	82		65			22,231
8	108	77		65			15,846
9	95	70			64		15,708
10	106	75			63		20,288
11	118	81			63		24,146
12	118	76			61		20,888
13	120	82			61		26,645
14	121	82			62		27,716
15	108	83			62		27,752
16	111	82				60	25,361
17	100	77				60	21,797
18	100	78				60	22,686
19	103	76				60	23,236
20	97	76				59	22,274
21	92	7[illegible]				60	21,049

Experiments conducted in Southern California would indicate that the ground temperature at a depth of three feet below the surface is about 15° to 20° above the average minimum atmospheric temperature.

It is, of course, impossible to determine at what point gas in a transmission line will reach minimum ground temperature, but a study of the temperatures in the above table, together with an investigation as to the average minimum atmospheric temperatures will serve as a guide for the location of main line drips.

An interesting comparison of maximum and minimum temperatures with ground temperatures at various depths is to be found in Serial 2857, Department of Commerce Bureau of Mines, entitled "A Comparison of Ground Temperatures at Different Depths and Temperature Fluctuations of the Atmosphere" by E. L. Rawlins and T. W. Johnson.

Air Filters On Gas Engine Intakes

ONE of the recent developments in accessories for internal combustion engines is the air filter, or air and dust separator, the purpose of which is to prevent silica and other abrasives from entering the engine cylinders with the change of air. It must be kept in mind, however, that the wear due to abrasives entering with the intake air may be negligible as compared to that caused by excessive carbon deposit, or insufficient lubrication. For this reason it is felt that satisfactory lubrication must be achieved before the advantages of an air filter can be realized.

The air filters suitable for use with gas-engines may be grouped into two general classes; the felt bag type, and the oil type.

As the name implies, in the first type, the intake air is caused to pass through one or more pieces of felt cloth, which are usually made in the form of a bag, and supported on a wire framework. The dust settles upon the outside of the bag, from which it is brushed or blown off at suitable intervals.

The second type of filter consists of a box-like framework, or cell filled with oil-soaked steel wool or similar material, through which the dust-laden air is caused to pass. The dust is deposited on the oil film as the air passes on, into the cylinder. When the oil becomes saturated with dust, the filter is washed and then dipped in fresh oil.

The oil type of filter can be made to clean itself automatically by suspending the cells on a slowly revolving endless belt, the lower portion of which passes through a tank of light oil.

The prime requisite of any type of filter is, of course, that it remove practically all the dust from the air passed through it. Second in importance is the requirement of a very low resistance to the passage of air, not only when the cells are freshly cleaned, but during the entire run, up to the time of the next cleaning. A third consideration is the ability of the filter to successfully withstand the shock of a severe backfire. However, some manufacturers of felt bags maintain an occasional backfire is not unwelcome, as it blows the dust off the surface of the bags. Finally, the item of low maintenance cost is to be considered. Cells, or sections, should be of light weight, and readily accessible, so that they may be cleaned easily. The period between cleanings should be as long as possible.

In a broad sense, the study undertaken by your committee had two objectives. First was the determination of the conditions under which an air filter would be an economical investment. Some little consideration has been given to the problem of furnishing a test that would enable those charged with the design of a compressor plant to say of a given locality; "An air filter is needed here," or "An air filter is not needed here."

This involves setting up a relation between dust concentration in air and cylinder wear. Before so doing, it becomes necessary to determine the ratio of total cylinder wear to wear chargeable to abrasives introduced into the clinder via the air intake. Unfortunately, it cannot be assumed that this ratio is always proportionate to the percentage of silica present in the carbon deposit, and therefore a carbon analysis is of little value for our purpose.

It is felt that the only satisfactory method of isola-

Report of Sub-Committee on Compressor Stations; Natural Gas Transmission Committee, Pacific Gas Assn. Meeting, Pasadena, Cal., Sept. 9-12, 1930.

Portable Device for Measuring Dust Content of Air

ting the wear due to dust only, is to install an air filter on one cylinder of a twin engine provided with new power pistons, rings, and liners. During the operation of this unit, the dust content of the surrounding atmosphere should be measured at suitable intervals. Upon the completion of a test run of twelve months, the two cylinders could be measured, and a fair idea of wear chargeable to dust would be obtained.

Through the cooperation of several manufacturers, your committee was able to install three filters on the two twin 160 H. P. engines at the Southern Countries Gas Company's Santa Paula plant. The setup consists of one "Protectometer" felt bag type filter; one "Annis" felt bag type filter; and one "Reed" oil type filter, the fourth intake being left unprotected.

Your committee was unable to secure air filters in sufficient time to permit of a test being run upon which conclusions could be drawn, and definite recommendations made regarding the most practicable type of filter.

In order to develop the relation between wear due to dust particles, and the dust content of air, a portable measuring device was constructed which consisted of a fan type blower of known capacity connected to a special filter of the felt bag type. The removable felt bag is to be weighed before and after a test run, so that the percentage of dust in the air can be readily calculated. This device is shown in the illustration herewith.

Due principally to the fact that your committee's blower and test filters have been in operation but a short time, no positive results can be presented at this date. A recent examination of the Santa Paula engines, which are protected by air filters, showed a marked reduction of dust deposit in the three mixing valves as compared to that on the unprotected engine.

In conclusion, your committee recommends that with the cooperation of air filter manufacturers, a series of additional tests, similar to that in progress at Santa Paula, be conducted over a period of twelve months. The engines on which the tests are to be made should be fitted with new cylinder liners, pistons, and rings. The engines should be operated for approximately two weeks to allow the new parts to become broken in, after which the cylinder liner, piston and rings should be carefully measured and the measurements recorded before beginning the actual test. Dust concentration measurements should be taken at suitable intervals, throughout the year, to compensate for seasonal changes.

Loads, lubrication, cooling and other operating conditions should be duplicated as nearly as possible on each unit undergoing the test, so that the only variables encountered will be the concentration of dust in the air and wear due solely to abrasives entering via the air intake. A test such as this should provide enough data to establish a definite relation between average dust concentration and resulting cylinder wear.

Acknowledgment is made to the Staynew Filter Corporation, the Reed Air Filter Co., the Annis Filter Co., and other manufacturers and their representatives, who kindly supplied equipment and data for this report.

Heat Dissipation From Dry Exhaust Lines

AT the present time, two methods of installing gas engine exhaust lines are in general use.

The "bottom exhaust" method is to run the exhaust piping in a trench, tunnel, or basement, under the engine room floor, to a point outside the building. The "top exhaust," or overhead method is to run the the exhaust piping vertically from the exhaust valve cage up through a hole in the roof of the building.

It is well known that approximately one-third of the heat of combustion generated in a gas engine is wasted in heating the gases which pass to the atmosphere via the exhaust piping. During normal operations, the temperature of this piping is raised to about 400 degrees Fahrenheit.

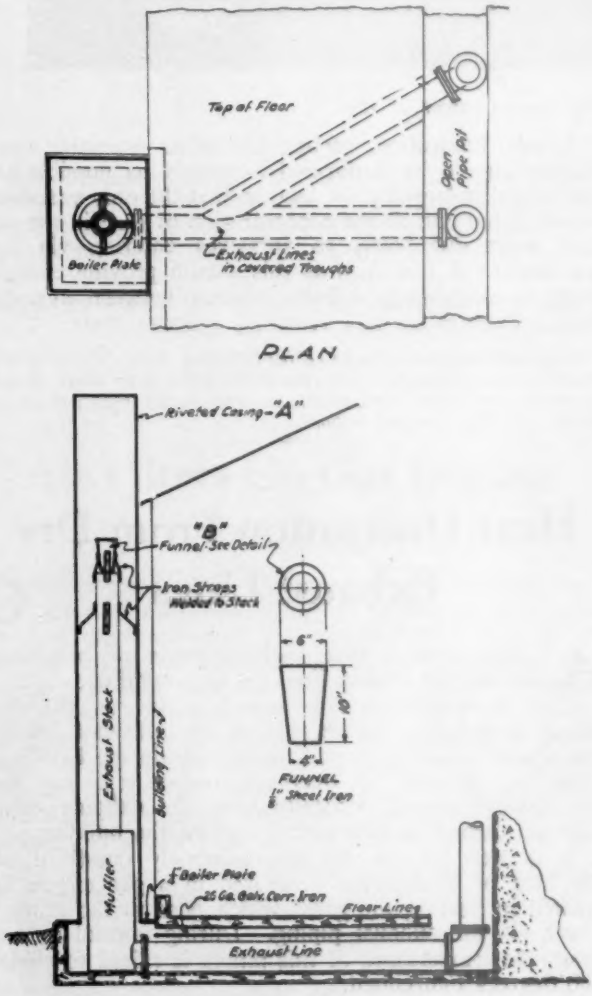
When the bottom exhaust method is used, and no special means provided to dissipate the heat radiated from the piping, the engine room floor and atmosphere becomes uncomfortably hot. The top exhaust method overcomes the problem of hot floors, but the room temperature is somewhat higher, and the hot exposed exhaust pipes are a fire hazard. In either case, however, the chief damage done is the lowering of operating personnel efficiency.

A more recent experiment consisted of suspending a sheet of metal in a horizontal position midway between the exhaust pipe and the bottom of the floor slab. This scheme was not successful, as the sheet of metal would in time reach a temperature midway

Report of Sub-Committee on Compressor Stations; Natural Gas Transmission Committee, Pacific Gas Assn. Meeting, Pasadena, Cal., Sept. 9, 1930.

between that of the piping and the floor slab, after which it had little effect upon the heat transfer.

At the Ventura Fuel Company's plant which operates 760 H. P., twin tandem double-acting gas engines, the floor temperature originally averaged 180 degrees Fahrenheit. As complete jacketing of the exhaust lines appeared impracticable, it was decided to suspend a sheet of asbestos millboard, supported by corrugate iron sheeting, between the floor and the exhaust piping. This installation reduced the floor temperature 60 degrees Fahrenheit, without any detrimental effect upon the dissipation of heat from the exhaust line.



Draft Inducer

At a plant at Signal Hill, which contains 160 H.P. units, iron plates are used to cover the exhaust pipe trenches from the engine to the outside walls of the building. A thermometer mounted directly over the center of the floor plates showed a temperature of 250 degrees Fahrenheit.

The mufflers are mounted in a vertical position outside the building wall. One of these mufflers was jacketed with a piece of 12 gauge (U. S. Std.) riveted casing, A—See illustration, which extended up about five feet above the end of the muffler outlet. A funnel, B, was installed on the end of the muffler outlet to divert the exhaust gases outward, thereby inducing a draft inside of the casing. In this way a movement of air is set up through the jacket and through the exhaust line trenches under the floor plates. After this equipment was put into operation, the afore-mentioned thermometer dropped from 250 degrees Fahrenheit to 100 degrees Fahrenheit, thereby greatly improving working conditions in the engine room.

A thermometer wired on a bare muffler, and another on the casing, outside the building wall, showed 380 degrees Fahrenheit, and 180 degrees Fahrenheit respectively. Thus the accident and fire hazards caused by hot mufflers and exhaust lines are eliminated, and engine efficiency is increased by removing a source of heat that is adjacent to the air intake pipe.

In the case of top exhaust engines, the temperature of the surrounding air has been materially reduced by jacketing the exhaust lines with a light steel casing, which may be from two to four inches larger in diameter than the O.D. of the exhaust pipe. This jacket is left open at the top and bottom, the top extending through the engine house roof. Sufficient draught is induced, between it and the exhaust pipe, to dissipate most of the heat.

The light casing serves a second purpose by preventing combustible material from coming in contact with the hot exhaust line, and it also protects the operators from accidental burns.

Several methods of reducing engine room temperatures have been tried in the past. At one plant using the overhead exhaust, the piping was jacketed with asbestos. This effectively reduced the temperature of the air within the engine room, but the exhaust pipe itself became so hot that the metal gradually oxidized and crumbled away, leaving only the shell of asbestos remaining. This experiment demonstrated that any successful method must not decrease the dissipation of heat from the piping.

These experiments have proven that the floor and atmospheric temperatures in engine rooms can be lowered to a satisfactory value by controlling the dissipation of heat from the exhaust lines. Close observation has indicated that the efficiency of the operating personnel is materially increased when a comfortable temperature is maintained.

Very little choice appears between the three filters at this time. Each appears to intercept most of the dust. The cells of all three are readily accessible, easily cleaned, and substantially built. Water columns showed a partial vacuum of from one to two inches, and the readings for each filter have not increased one-tenth of an inch since the test was started.

The results of a series of tests made by the United States War Department in 1924 definitely established the value of air filters installed on automobile engines. Their method was to mount two new engines on test blocks, and connect the carburetor air intakes with a specially prepared "dust box." The hose leading from the box to one intake was left unprotected, and the other was provided with a suitable filter. It was found that at the end of the equivalent of three thousand miles, the unprotected motor was completely worn out, whereas the protected motor was in first class condition. Furthermore, the unprotected motor showed a 40% higher oil consumption.

In conclusion, your committee recommends that in the design of future compressor plants, provision be made for exhaust line heat dissipation by methods similar to the ones described herein, and that wherever practicable in existing plants, alterations be made so as to permit the same benefits being derived.

Sea Divers Help Lay Gas Main

REGULAR ship-yard launching equipment, as well as other nautical apparatus including a deep-sea diving crew and a fleet of about forty row boats, were used by the Consolidated Gas Company of New York in completing the extension of a gas main to supply City Island with gas fuel.

Work was started on laying the five mile gas main from the company's Pelham Plant to City Island on July 3, with one hundred men, including the sea-diver and his crew, and a battery of mechanical trenching, back-filling, and compressing machines on the job.

The main crosses Pelham Bay Channel at a point seven hundred feet wide at low tide, and one thousand feet wide at high tide. This section of the pipe, which was welded and double-welded on the shore, was launched on a system of blocks just as ships are launched at boat yards. Twenty or thirty pairs of boats were used to float it across, and when in place, extending from shore to shore, it was lowered to the bottom and dropped into a special trench prepared by the diver.

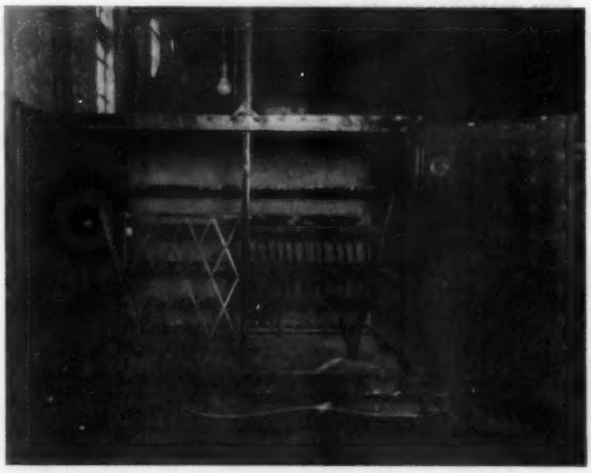
Pontoon Rigging for Floating Pipe onto River. Diver Works from Boat in Background

The gas main is six inches in diameter, and will carry gas at medium pressure. The route is through Pelham Bay Park and across the Channel to the Island. The pipe has been coated with a special preparation to resist corrosion, the section going under the Channel receiving seven different applications.

Modernizing with Gas in the Railroad Shops

FOLLOWING the initial installation made about a year ago, the Chicago & Alton Railroad Company had been steadily adding to the gas heating appliances in its shops at Bloomington, Illinois, which employ 2,000 men, and C. M. House, Superintendent of Motive Power, is considering further use of gas where experiments have proven economy and greater efficiency can be effected.

The latest device provides for japanning operations in the coach shop where a new oven has been placed in position. The inside dimensions are as follows: depth —four feet, seven inches; height—five feet, two inches; and width—seven feet. The oven is provided with a six inch thickness of 85 per cent magnesia insulation, and there is high pressure Surface Combustion Inspirator connected to a two inch pipe burner ninety-two inches in length and equipped with twenty-two lava tips,



Japanning Oven in Coach Shops

spaced at three and three quarters inches. A twelve inch baffle is placed over the pipe burners, twelve and one half inches from the bottom, to prevent drippings from coming in contact with the flame. The oven is operated at a temperature ranging from 35° to 42° Fahrenheit, depending upon the character of the job. The bakes vary from two to three hours. This oven produces a much harder finish than the type formerly used, which was heated by steam coils.

The foreman of the coach shop, after giving the gas heating a severe test, has unqualifiedly endorsed it and finds that it is far superior to other methods of heating, while the results are entirely satisfactory in every way.

Furnace for Tempering Tools

The company has also installed two new furnaces in the tool room of the locomotive shops for handling high speed tools, as well as a lead pot for retreating high speed tools. There is also a new soft metal furnace for melting lead used in weighting the spokes of driving wheels.

XIII—Miscellaneous Househeating Considerations

REFERENCE to the Radiation Chart and the accompanying tables clearly show the advantage of including heat insulation in building construction. Following through the heat losses of the clapboard wall previously used as an example, and including practically all types of insulating materials, it will be found that 10 sq. ft. of cast iron steam radiation (C. I. R.) will offset heat losses from vastly different areas. The table below gives the areas of exposed surfaces when the insulation specified is used.

AREAS OF EXPOSED WALL SURFACE HAVING HEAT LOSS EQUIVALENT TO 10 SQ. FT. C.I.R.

70° F. Inside to 0° F. Outside
Base Wall is Clapboard, Wood Sheathing, Studding, Lath and Plaster

	Sq. Ft. Exposed Wall
Base Wall—no insulation	151
Base Wall ½" Quilted Felt	266
Base Wall 1 layer Cane Fiber between Sheathing and Studding	254
Base Wall 3⅝" Cellular Gypsum Concrete Fill between Studding	312
Base Wall 3⅝" Loose Gypsum Concrete Fill between Studding	340
Base Wall 1½" Cork board replacing laths	312
Base Wall 2" Cork board replacing laths	369

The increase in exposed wall area made possible by insulation varies from 68% with a ½" material to 145% with 2" board. It must not be inferred that the same reduction in the amount of installed radiation can be made, as heat loss also takes place through windows and doors, the materials of which are not subject to insulation. In addition, the heat needed to raise the temperature of the air which seeps through cracks also adds considerable load. An analysis of a great many buildings for which the heat losses were calculated gives the following distribution of these losses.

DISTRIBUTION OF HEAT LOSSES FROM BUILDINGS—ALLOWANCE FOR PREVAILING WIND OMITTED

Air Changes and Infiltration	20.8%
Walls	29.6
Windows and Doors	26.0
Floors	8.8
Roofs or Ceilings	14.8

Although windows and doors are relatively a small proportion of the building the heat losses from these points are very high and far out of proportion to their exposure. Double doors and storm windows are very helpful in reducing heat losses, not only the direct transmission losses but also the indirect leakage around cracks. An impression seems to exist that making such additions gives an atmosphere which is dead and possibly unhealthful. The usual building construction, however, is sufficiently open and enough movement exists between rooms and outside to give complete ventilation under all normal conditions.

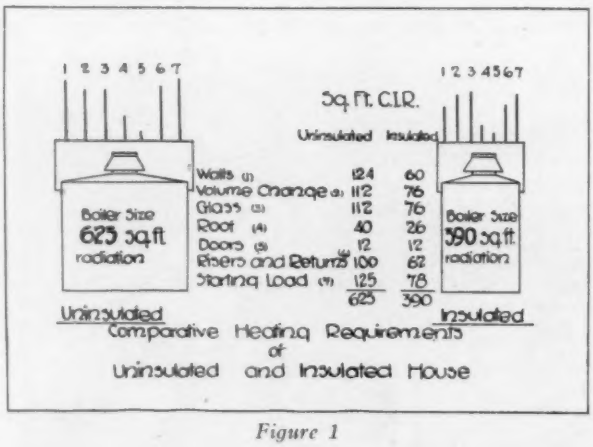

1 2 3 4 5 6 7
Sq. Ft. C.I.R.
Uninsulated
Insulated
Walls (1) 124 60
Volume Change (2) 112 76
Glass (3) 112 76
Roof (4) 40 26
Doors (5) 12 12
Risers and Returns (6) 100 62
Starting Load (7) 125 78
625 390
Boiler Size 625 sq. ft. radiation
Boiler Size 390 sq. ft. radiation
Uninsulated
Insulated
Comparative Heating Requirements of Uninsulated and Insulated House

Figure 1

Figure 1 shows the heat losses from insulated and uninsulated houses and the boiler size needed for these houses. Insulation in new houses, "The fuel that is bought but once," reduces materially the cost of the heating plant, with the overall cost of the building changed but very little as the cost of insulating offsets the savings in the cost of the heating plant. Reducing the size of the system 40% for the average house of 500 sq. ft. equivalent radiation lowers this cost approximately $400 for good steamfitting work. The cost of adding insulation depends on the material selected and the method used for its application, but will vary between $350 and $800. The added cost is quickly returned, not only by lowered fuel costs but by greater year-around comfort. Heating is faster and more uniform throughout the house and the insulation protects the interior against excessive summer temperatures giving cooler and more comfortable living and sleeping rooms.

When an existing house with the proper heating system is insulated without changing the total radiation, the plant in most cases being oversized gives a shorter heating period and longer cooling time than for a system designed and installed exactly in accordance with calculations. This gives some peculiar results, particularly during the cooling periods. Insulation is so effective in reducing heat losses that the radiators and piping become cold and with a hot water system can even be lower than the room temperature resulting from the cir-

culation of the water cooled by the colder cellar. A reverse radiation occurs. With radiators warmer than the room they emit heat and the body has the sensation of warmth created by the source of heat. On the other hand, when the radiators have cooled with no apparent change in room temperature and walls begin to cool, the body acts as the heat source and loses heat. A sensation of clamminess or chill is produced and the condition is technically named "cold 70." This may continue for some time, at least until the point is reached at which the room thermostat starts the boiler and the radiator again is at a temperature higher than room. The simplest method of overcoming this condition of discomfort is to install a control which anticipates temperature change or one that prevents low circulating temperatures. The more permanent method is to exactly balance the system by removing the excess radiation.

Comparative Operating Costs

With house heating and particularly automatic heat, two sets of costs exist, the anticipated and the realized. In the beginning, the householder looks askance at the fuel costs of anything new. He is told of comfort and labor saving; these are tentatively admitted. He is told of cleanliness and space saving; he believes the cellar will be improved, but the living rooms always have been kept clean. He is told of continued warmth during waking hours and uniformity throughout the house, these giving better health conditions. This last result may be so, but he is skeptical. And after the other advantages are cited he still sees one thing, which may be the fuel bill, or the belief that he is a pioneer experimenter, or his main inhibition. But after a winter's operation, the "realized" costs are very different. His skepticism or disbelief has not only vanished but is his strong point. Perhaps the labor saving permitted extra sleep or enjoyment on Sunday mornings, or curtains and walls were not in need or redecoration, or a maid had much more leisure, or because of automatic gas heat it was possible to give greater attention to a sick child, or the service department of the Gas Company oiled the jacket and painted controls in the Spring; but the cost of fuel was not even secondary, it did not exist. The intangibles in the original sales story have proved much greater than anticipated.

Operating costs are difficult to tabulate, because of the great diversity in fuels available, their unit costs, the length and severity of heating season, etc. Simple basic principles for comparison, however, can be laid down. Costs consist of fuel, direct and indirect labor, and investment costs.

Fuel Costs

The fuel cost depends on four factors:—the cost per unit (ton, gallon or cubic foot) the fuel efficiency, the length of heating season (number of degree days) and the required radiation or heat loss of the building.

Commercial considerations determine the unit fuel cost, operating conditions determine the fuel efficiency and for a particular installation, the number of degree days and required radiation are constant.

As a result of many operating tests, established values are available showing the fuel efficiencies. These can be tabulated as the overall seasonal efficiency.

Fuel	*Efficiency*
Soft Coal	40—45%
Hard Coal	48—53%
Oil	48—53%
Gas	68—75%

They can be simply deduced for any given locality by obtaining from the Weather Bureau the average temperature for the calculation of the number of degree days, measuring the fuel used and determining the heat loss of the building.

As an example, consider a building in the vicinity of New York City. The Weather Bureau shows that 5400 degree days occur. The building has a heat loss equivalent to 500 sq. ft. C. I. R. The coal consumption is 15½ tons. The design temperature is 70° inside to 0° outside, and the heating season is 250 days during which the mean temperature is below 65°.

From this data it is found that the heat input to the boiler is 149.3 BTU per sq. ft. C. I. R. per degree day.

$$\frac{15.5 \text{ (tons)} \times 2000 \text{ (lb.)} \times 13000 \text{ (BTU per lb.)}}{5400 \text{ (degree days)} \times 500 \text{ (degree days)}} = 149.3$$

The heat output from the radiator in BTU per sq. ft. per degree day is obtained by multiplying the heat emission per sq. ft. C. I. R. (240 BTU) by the ratio of the actual degree days to the maximum capacity of the heating plant which is the number of days in the heating season by the difference between 65 and the outside design temperature, since the system can emit heat to overcome zero outside temperature for the entire heating season.

In this example, this ratio is

$$\frac{5400 \text{ (actual)}}{65 \times 250 \text{ (maximum)}} = \frac{5400}{16250} = 33.2\%$$

and the heat emission or output

$240 \times .332 = 79.7$ BTU per sq. ft. per degree day

The overall fuel efficiency is therefor 53.4%

$$\frac{79.7 \times 100}{149.3} = 53.4\%$$

Similarly, if the oil consumption for the same house was 2970 gallons per season, the heat input would be 154 BTU per sq. ft. C. I. R. per degree day.

$$\frac{2970 \times 140{,}000}{5400 \times 500} = 154$$

and the overall fuel efficiency — 51.7%

$$\frac{79.7 \times 100}{154} = 51.7\%$$

The gas consumption for this house would be 550,000 cu. ft. and the heat input is 110 BTU per sq. ft. C. I. R. per degree day.

$$\frac{550{,}000 \times 540}{5400 \times 500} = 110$$

and the overall fuel efficiency 75.9%

$$\frac{79.7 \times 100}{110} = 72.5\%$$

Although this data has been calculated to an average size house, the fuel efficiencies are based on tests which cover a number of houses.

To obtain the fuel cost from the unit price and efficiency the procedure is to first calculate the heat losses of the building. This value is divided by the heat available per unit of fuel and multiplied by the number of degree days, the operating percentage of the maximum heating capacity and the unit price.

For example, the building has a heat loss of 500 sq. ft. C. I. R. or 120,000 BTU, the season is 250 days, number of degree days 5400, and the fuel cost $15 per ton. The coal cost is therefore $234.

$$\frac{120{,}000 \times 5{,}400 \times .332 \times \$15.}{.53 \times 13000\ 2000} = \$234.$$

With oil at 9 cents per gallon, the fuel cost is $261.

$$\frac{120{,}000 \times 5{,}400 \times .332 \times .09}{.53 \times 140{,}000} = \$261.$$

To this cost must be added the cost of gas for ignition, and power for pumping oil and supplying air. The gas pilot operates probably 7 hours daily at 15 cu. ft. per hour and the remainder at 2 cu. ft. per hour, or a total of 140 cu. ft. daily for 250 days. This is equal to 35,000 cu. ft. This would probably be charged at the domestic rate of $1.00 per M. cu. ft. or $35.00.

The motors require .05 KWH per degree day, or at a 5 cent rate, the charge is $13.50. The total fuel cose is therefore, the sum of these items, or $309.50.

With gas at 80 cents per M. cu. ft. the fuel cost is $440.

$$\frac{120{,}000 \times 5400 \times .332 \times .80}{.725 \times 540\ 1000} = \$440.$$

Labor Cost

The direct labor cost is for handling coal and ashes. This varies from $2.00 weekly to 75 cents daily. Estimating it conservatively at $100. annually is close to the average.

Neither oil nor gas require any direct labor although it is necessary in some localities to check on the oil supply and order oil when the tanks are running low.

Indirect labor costs are seldom considered, although present. These consist of the reduction in cleaning of the house with gas fuel, the elimination of some redecoration of walls and curtains and the reduction of window cleaning. Insurance policies against oil films and smudges on living room walls indicate that indirect labor can justly be charged against oil fuel.

Investment Costs

In the final analysis, fixed charge on an investment amounts to practically the same thing as replacing worn out equipment. Whether interest and depreciation are charged on the basis of original cost and the life of the equipment as determined by experience, or an investment for replacement is made periodically, the final expenditure is the same.

Experience shows that the coal boiler life is at least 30 years and the same is true of gas boilers and accessories. Boilers used with oil, however, require replacement every 15 or 20 years, tanks have about the same life and pumps and burners a life of 7 to 10 years.

To the fuel cost and labor cost the third class of costs must be added,—those concerned with the purchase and upkeep of equipment. To coal costs, a yearly addition of 9 1/3% of the original cost of the plant must be made. Of this, 6% represents interest on the purchase and 3 1/3%, the sum set aside for replacement.* A similar addition is made to the gas boiler. For oil equipment the addition is much larger and divided according to the life of the different items. Interest at 6% on the original purchase is added and depreciation of 5% on the boiler and tank and 10% on the burner and pumps.

These principles were followed in the Chapter on Comparative Fuel Costs, Nov. 1929 issue, *American Gas Journal*, and the summary of the costs given there is repeated here.

INVESTMENT COSTS

	Coal	Oil	Gas
Boiler and Insulation	$260.00	$260.00	$480.00
Thermostatic Control	115.00	Included in burner	115.00
Burner, Tank, Pumps		$900.00	
Total	$375.00	$1160.00	$595.00

YEARLY OPERATING COSTS (16 Hours 70° F. 8 Hours 55° F.)

	Coal	Oil	Gas
Depreciation Boiler (30 yrs.)	$12.50	(20 yrs.) $23.00	(30 yrs.) 19.83
Depreciation Burner	..	(10 yrs.) 70.00	..
Interest on Investment-6%	22.50	69.60	35.70
Labor	100.00	..	..
Service and Repairs*	..	40.00	..
Total Excepting Fuel	135.00	202.60	55.53
Electric Motor and Gas Pilot	..	42.00	..
Fuel—13 tons at $14.50	188.50	2250 gal at 9c 202.50	446,000 at 80c 356.80
Total Operating Costs	$323.50	$447.10	$412.33

* The charge for service and repairs is on a yearly basis by the oil burner distributor, the value of $40 being the usual cost for all makes of burners. The Gas Company as a rule provide free service except for repairs caused by customer's negligence and service on the part of the coal man is very rare.

Beautifying the Furnace Room

This topic needs little discussion as many examples of this practice are everywhere evident. The furnace room has been redecorated into billiard room, music room, arsenal, hunting lodge, nursery, rathskellar; in fact, every conceivable kind of living and recreation center can be found there. Indeed, this idea is so firmly fixed that boilers are available in jackets to match the scheme of decoration. In spite of this, the furnace still is considered a piece of cellar equipment. This will become changed in time, particularly for commercial and semi-commercial buildings. Vault space, display space and storage space are valuable.

A bank can install many safe deposit boxes in the space used by the boiler room; a display window on the subway entrance steps will return good profits; and complete space for automobile storage, paper storage or merchandise can be released by removing the boiler or furnace from the cellar to the roof. Many of the larger installations are down feed systems in which the steam is carried to the top by a single main which branches and then feeds from the drops. A boiler on the roof can be very easily cut into the steam main. Much condensate and radiation will be eliminated by cutting off the riser. In its place will be a small riser in which condensate is returned to the boiler, by a basement pump. Instead of a large steam riser and smoke flue, a gas line and the small return will be all that is needed. The boiler will have a short flue run, overcoming the disadvantage of cold chimneys and heavy air columns. It will be close to the sprinkler tank for which a separate line from the boiler is required and the characteristic of gas, the only fuel that runs up hill, will add many prospects to the many customers so completely satisfied with gas service.

(October Issue will deal with "Space Heaters")

* *As the interest earned makes the calculations very involved, the straight value is assumed.*

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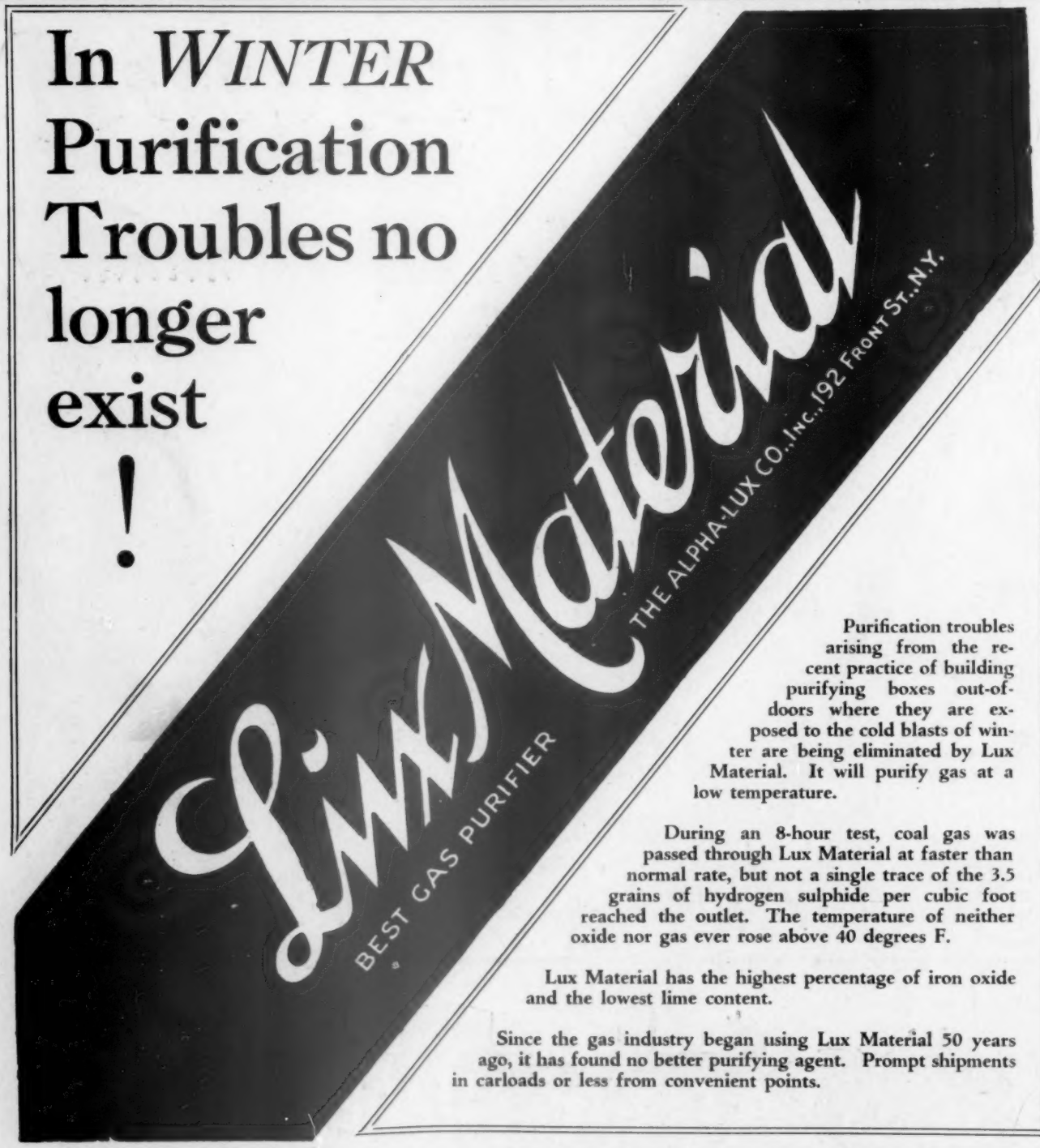
Gas Construction Co.

In *WINTER* Purification Troubles no longer exist !



Purification troubles arising from the recent practice of building purifying boxes out-of-doors where they are exposed to the cold blasts of winter are being eliminated by Lux Material. It will purify gas at a low temperature.

During an 8-hour test, coal gas was passed through Lux Material at faster than normal rate, but not a single trace of the 3.5 grains of hydrogen sulphide per cubic foot reached the outlet. The temperature of neither oxide nor gas ever rose above 40 degrees F.

Lux Material has the highest percentage of iron oxide and the lowest lime content.

Since the gas industry began using Lux Material 50 years ago, it has found no better purifying agent. Prompt shipments in carloads or less from convenient points.

"LUXIT H. T." Cement (Dry)

COMPANY MEMBER OF AMERICAN GAS ASSOCIATION

Philadelphia Office: 2767 Gaul Street

Chicago Office: 343 S. Dearborn Street

THE ALPHA—
192 FRONT STREET

Lux-Sponge

THE PERFECT READY MIXED OXIDE.

Two (2) Lux-Sponge Plants *ready to serve you promptly.* Shipments from Philadelphia, also from Chicago.

Lux-Sponge is particularly adapted to the medium sized and smaller gas plants where quick purifying results are essential for rapid send-out.

The high activity of the Lux-Sponge will purify the gas with greater rapidity at the minimum cost per thousand feet.

Lux-Sponge is made of carefully selected coarse shavings thoroughly impregnated with our incomparable Lux-Material, by the use of special machinery.

We mix 20 lbs. Lux-Material per bushel of shavings for Water Gas and 25 lb. Lux-Material for Coal Gas.

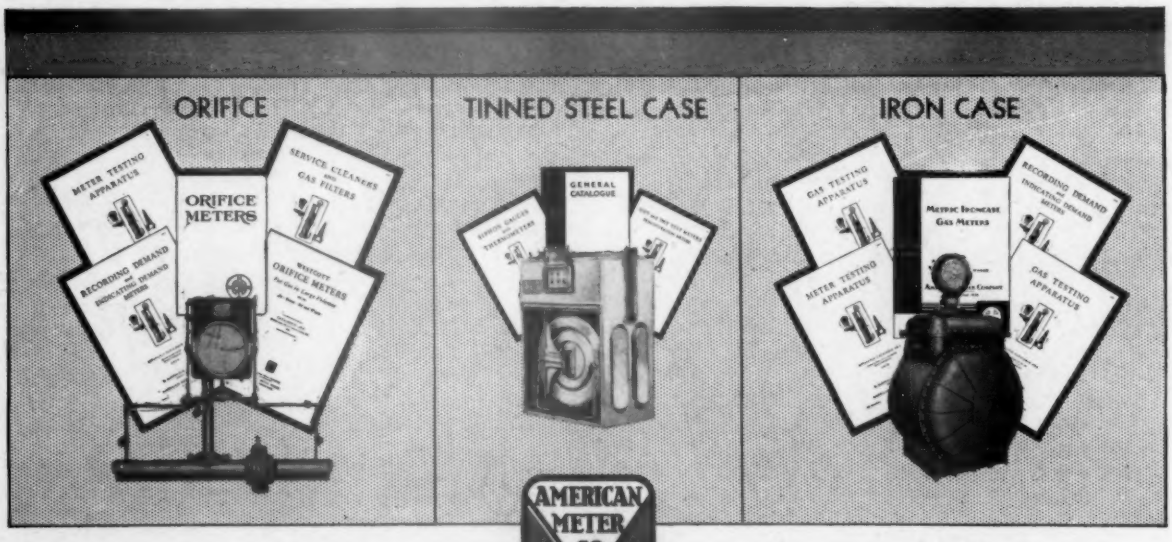
These combinations form a ready-mixed oxide that is unsurpassed and give the greatest satisfaction in the type of gas where used.

For Patching Hot Retorts, Refractory Linings, etc. Shipped in 110 lb. bags.

Order Sample Shipment Today!

LUX COMPANY INC.

NEW YORK CITY, N. Y.



AMERICAN METER CO
MEASUREMENT ENGINEERS
CUBIC FEET

You Can Get The Information

at Gas Measurement Engineering Headquarters

On measurement by Tinned Steel Case, Ironcase, Westcott Orifice and Linderman Orifice Meters.

WHAT type of meter will give best results for a given set of conditions? How can the measuring hook-up you would like to have be managed—with satisfactory operation a certainty? Are there efficient short-cuts—new meters—new practices—to accomplish each of your particular uses for measurement equipment?

In short, what is the last word having practical relation to your measurement problems as they will arise in the next installation? What's new, what's true, what's what—in measurement engineering?

You can always be sure of getting authentic information from *Gas-Measurement-Engineering Headquarters*. This source of basic research for positive displacement and orifice meter measurement presents broad, comprehensive and complete data. The information is easy to obtain; easy to follow; safe to use.

Here is a partial list of current American Meter Company publications. Check your files to see wherein they are not up-to-date, then ask us for the publications you want or describe the conditions to be met, if you wish specific recommendations or data.

• • •

AG-4 Recording and Indicating Demand Meters
E-6 Westcott Volume and Pressure Recording Gauge
E-20 Instruction on testing high pressure meters
EG-2 Westcott Orifice Meters
E-2 Measurement by Orifice
E-3 Metric Indicating Flow Meters
E-4 Positive Displacement Meters
E-5 Metric Rate-volume Controller

AMERICAN METER COMPANY
INCORPORATED
The World's Largest Manufacturers of Gas Meters and Allied Apparatus
ESTABLISHED 1836
GENERAL OFFICES : 105 W. 40TH STREET · NEW YORK, N.Y.

SALES · ERIE · DALLAS · TULSA · DENVER · LOS ANGELES · SAN FRANCISCO · KANSAS CITY
SERVICE · PITTSBURGH · CHICAGO · PHILADELPHIA · NEW YORK · BALTIMORE · BOSTON · ALBANY

Merchandising Views and Reviews

SPEAKING of home heating and such provokes the question, why not a big "Everybody for Gas Incineration" drive during Fire Prevention week or at some other time during the early fall when folks again get into the house and the garbage problem becomes a real one? Why not a home laundry drive by every gas company in the country in September when the kiddies are off to school and the fall rains set in.

Every gas company in the land driving at the same objective certainly could put over the use of more gas appliances in a big way. Why not, Laundry Dryers during September, radiant and gas coal and wood-fires during October, ranges during October, etc., with the same sort of a concurrent selling effort in the spring.

DESPITE the talk of depressions we find the gas man, who plans his work and works his plan, setting up some new records. However, we must say he is not the man who devotes his grey matter to thoughts of "Business has gone to the eternal bow-wows." He is the man who has the stuff and is alloting his waking hours to *asking 'em to buy*. WORK and good appliances promise to see the gas man safely through the coming twelve months." *American Gas Journal*, January, 1930.

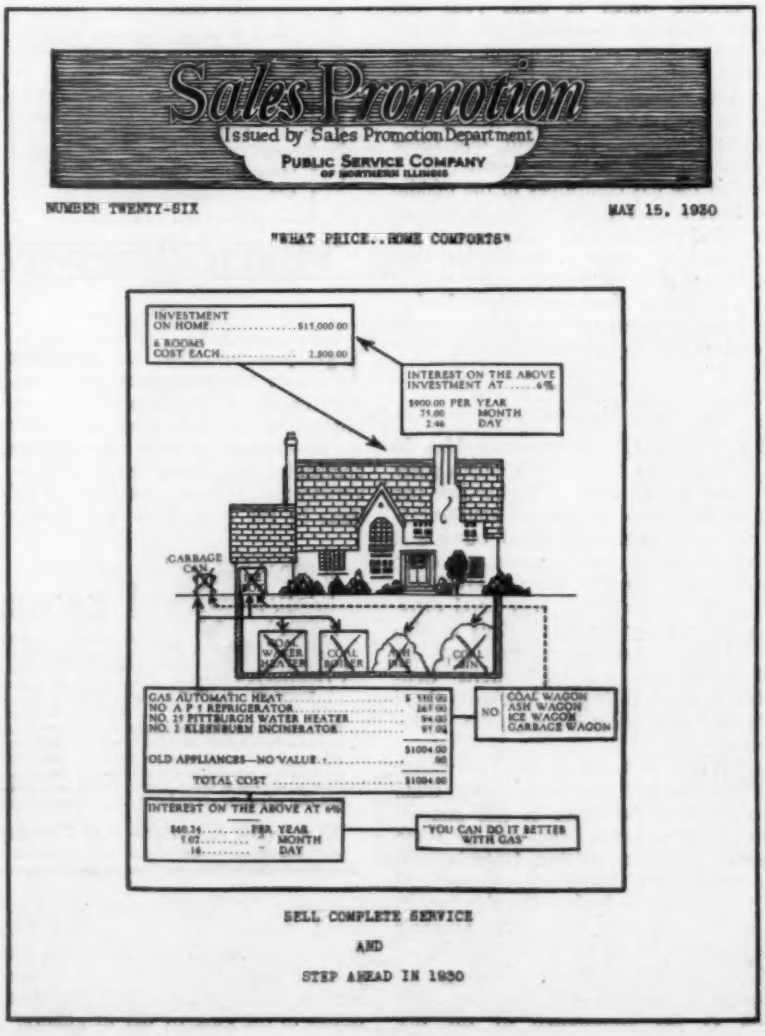
Nothwithstanding the fact that the glooms are being sung wherever gas men gather the above truth is water tight. When sales effort is being exercised sales are being made. New records are being established for the sale of ranges, refrigerators, gas heated ironers, and a new world record water heater sales has been recorded. Wherever WORK has been the war-cry sales records have hit a new high.

Gossip has it that where the help and the head-man are talking conditions, "things are tough". Sales forces that devote the daily get-together period to crying on each others shoulders are capturing no new customers—but, a green sales-girl, who replaced a rapid-fire-artist on the sales floor of a certain utility has increased store sales over one hundred per cent, by asking 'em to buy—a special one day sale in a small town (where salesmen could not "make ends meet") was so successful that the salesmanager is planning to make this type of selling a regular monthly event—a new recruit, who had not heard that there was a depression, sets a new high in commissions paid to any one man in any one month—a home heating salesman sells more furnaces during the recent record-breaking hot-spell than ever before in the history of his selling—a gas man captures the sale of over ninety bottled gas ranges in a country town in less than ten days. And so the story goes, wherever the sales force has been headed by a disciple of old hard-boiled WORK.

WE heard of a gas man who has chosen a new premium for use in connection with gas range sales. This man is offering a liberal allowance or an electric kitchen clock for the old gas range. The idea is a new one and may be of interest to the man who is looking for a practical premium.

A gas man who is a convert to the "added bonus idea" has set-up a plan whereby the sale of any item carried by the company, entitles the salesman to a certain number of "points" credit which may be applied to a number of premiums ranging from a mechanical pencil to a radio, etc. The point as a credit is equal to approximately one per cent of the cash resale price of the appliance and the number of points required to secure any of the premiums offered is built-up on a like ratio of the cash value of the prize. It is said that this plan has been used successfully by merchandisers of many other lines, from cash registers and adding machines to hosiery and other wearing apparel.

W. T. SMITH, Editor of *Sales Promotion*, an employee house organ published by the Public Service Company of Northern Illinois, has a novel way of presenting the advantages of the all gas home to readers of that publication. Working on the theory that a picture is worth a thousand words, Mr. Smith recently offered a whale of a sales argument in the way of a diagram showing how little it really costs to have many home comforts through the use of complete gas service. Look at this picture—you may wish to have an enlargement of it made for framing and use in con-



nection with sales meetings and for display purposes.

IN planning your Fall advertising to home managers, plan it with the idea of putting forth more facts in regard to what the modern gas appliance will do to make management of the home more efficient. When you run these ads

in your local daily ask for a position on either the "Woman's Page" or in the "Food Section" of the paper. These sections are growing in popularity and many women turn to them to read after scanning the other sections of the paper.

MANY men delight in "just sittin' around, smoking and reading," after the evening meal during the cool months of fall. Use this fact for an idea around which to build your fall window displays of radiant gas heaters and for writing your newspaper advertisement. Dwell on the fact that heat from the gas-fire may be had instantly, that the rays from the gas heated elements is chuck full of health, that there is beauty in the appliance itself.

One of the gas companies in the middle west built a cozy living room in one of their windows last fall, wherein a gas heater held the center of the display, that is said to have attracted more people into their store than any other display ever built—and best of all, it helped sell a great many radiant gas heaters.

LOUIS STOTZ advances an idea in *Siftings* that we think is worth passing along to the elect. "Eighty-five per cent of the prospects for gas house-heating are really concerned about waste and rubbish disposal after giving up their present coal burning plant," says Mr. Stotz, and are therefore very good prospects for gas incinerators. This is also true of folks that the oil man and the electric man have sold oil burners. September is an ideal time to follow-up these users and *ask them to buy* gas incinerators.

As we view it, a job of this kind might well be assigned to a specialty man. Build up a list of users of gas and oil heated homes, create one, two or three pieces of direct advertising, featuring gas incineration, mail these advertisments in small lots daily and after the third mailing have a salesman call on the prospect with an order blank for a gas incinerator, all ready to sign. Talk the advantages of disposing of garbage and waste, of sanitation, of the elimination of the fire hazard, of how there will be no smelly corners in the back yard, of no exposure to the elements for the home manager on cold rainy days, and then say, "sign here." Such a procedure will sell gas incineration.

Dispose of Garbage and Rubbish in the Sanitary Way
$15
price reduction during September small sum down and eighteen months to complete payment.
A Kernit gas incinerator, installed in your basement, furnishes a convenient, satisfactory and economical method of disposing of garbage and rubbish.
The pressure of your finger on the lighter ignites the gas and starts the incinerator. The gas shuts off automatically when the contents of the incinerator has been burned.
Use of the gas incinerator insures the quick, sure removal from your home of undesirable or inflammable materials
Write or call for interesting booklet "Modern Disposal of Waste."
NAME
STREET AND NO.
CITY
1105
1108
PUBLIC SERVICE

DO you see what we see—more and more gas companies using small advertisements to continuously put over and popularize the less used gas appliances. As an example of what some of these gas companies are doing we exhibit an advertisement run in a half dozen publications by the New York and Queens Gas

EXPOSED
WINDOW SHADES were made for privacy, but how often family affairs are still shared with the neighbors through the medium of the outdoor clothes line!
Surely, there is no need to elaborate on this theme. The modern family hangs its laundered washing in an Indoor Dryer, heated by gas and automatically controlled to provide proper temperature under all conditions. Dust, smoke and the elements can do no harm to your finest silks and linens. As a modern homemaker, you will want to know more about this very real convenience. Additional information will be sent on request without obligation.
NEW YORK & QUEENS GAS COMPANY
136-21 Roosevelt Ave. Flushing, Long Island 7st Flushing 5200

Company. This advertisement, as will be noted, features the gas heated laundry dryer. The appeal hits home too, for one of the things that the average woman abhors is to expose the family undies and things to the gaze of her neighbors. Ask ma, she knows the copy angle to employ when you wish to sell the home manager an idea.

GAS men who are (and where are those that are not) seeking some new information in regard to capturing and cultivating house-to-house salesmen should read an article by James Maratta, of the Minneapolis-Honeywell Regulator Company, in *Printer's Ink* of June

15. Mr. Maratta has approached the matter in an interesting manner in his article entitled; "How we Get House-to-house Salesmen and Keep Them Happy."

A GREAT many gas men say there is no sales profit to be derived from "showy window displays"—others say that sales at least do not warrant putting showmanship and motion into their windows. Be that as it may, now is a mighty good time for the "believers" to stage a bathing show of the old order in their windows to aid in the sale of the idea of having a storage water heater installed in the home. We refer to the "mammy and the pickininny" type that was so successful in connection with the sale of a famous water heater in the south a few years ago.

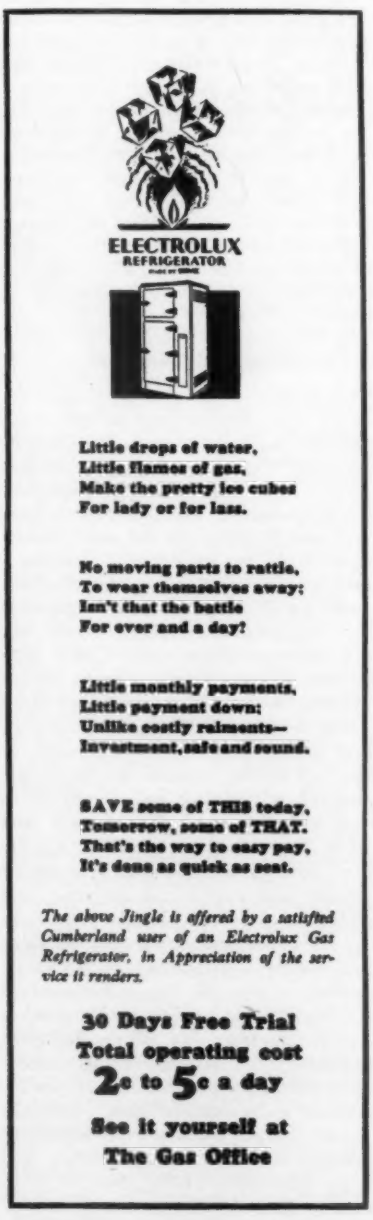
A GAS range salesman finding that the line was not showing a proper turnover for one of his gas company customers made a survey of that customer's stock and found that of the models carried, only twenty-five per cent (sixteen models were displayed by the customer) of them showed a worth-while turnover. That meant bad business for both the manufacturer and the gas company.

To correct the situation the manufacturer's representative prevailed upon the gas company to reduce the number of models carried to six. This immediately gave a good turn-over and an increased sale of gas ranges. Further, many numbers in many instances have retarded turn-over for the reason that they tend to promote indecision in the minds of the customer, who frequently walks out and into the store of a dealer who has fewer models and more reasons why his line is "just what the customer should purchase."

That too many models do fuss-up immediate sales is born out by the experience of several other specialty dealers whom we have recently interviewed. This is particularly true of a refrigerator dealer who admitted that he had hard sledding and lost many customers until

he reduced his display of refrigerators from ten to five models. If you are not getting a satisfactory turn-over on certain lines of merchandise it may pay you to give the matter of models a little thought.

WHEN a man turns rhymester there's a reason for it; something appeals to him very deeply. Also we know that gas men will express no astonishment when they read the advertisement reproduced on this page written by a Cumberland gas customer who purchased a gas refrigerator. The jingle was written by an enthusiast and J. A. Mayers and the Gas and Electric Appliance Company turned it into an advertisement. We wonder if any other gas men have customers who become poetic after purchasing a gas refrigerator or any other gas appliance. If so why not start a poet's corner, and use the jingles for advertising purposes.


ELECTROLUX
REFRIGERATOR
Little drops of water,
Little flames of gas,
Make the pretty ice cubes
For lady or for lass.
No moving parts to rattle,
To wear themselves away:
Isn't that the battle
For ever and a day?
Little monthly payments,
Little payment down;
Unlike costly ailments—
Investment, safe and sound.
SAVE some of THIS today,
Tomorrow, some of THAT.
That's the way to easy pay,
It's done as quick as sent.
The above Jingle is offered by a satisfied Cumberland user of an Electrolux Gas Refrigerator, in Appreciation of the service it renders.
30 Days Free Trial
Total operating cost
2c to 5c a day
See it yourself at
The Gas Office

WE HAVE always been of the opinion that any plan that adds to the compensation of the employee is bound to be productive, whether that added compensation comes from special employee sales direct or for prospects turned into the sales department and sold by regular salesmen. That we are not alone of this opinion is borne out by a letter sent to all employees of the Brooklyn Union Gas Company recently by Hugh Cuthrell, Manager of that company's New Business Department. The basis of compensation, method of procedure, etc. are clearly set-forth in the letter reproduced below, from the employees *Weekly Bulletin* issued by the New Business Department.

The Brooklyn Union Gas Company

NEW BUSINESS DEPARTMENT

HUGH CUTHRELL, Manager. 180 REMSEN STREET BROOKLYN, N. Y. TELEPHONE TRIANGLE 7000

To Employees of The Brooklyn Union Gas Company:

The following policy, will be effective as of July 11, 1930.

All employees, excepting supervisory people, will be paid the following amounts for the furnishing of leads to the various Sales Divisions which result in the sale of gas appliances within 60 days from the date of the lead.

RETAIL:	Central Heating Plant or Conversion Burner	$ 5.00
	Gas Refrigerator (Retail)	5.00
	Gas Refrigerator with Range	5.00
	Automatic Storage Water Heater	5.00
	Circulating Tank Water Heater	2.00
	Jarvis Thermoflash (conversion)	2.00
	Incinerator	2.00
	Laundry Dryer	2.00
	Ironer	1.00
	Oven Heat Regulated Range	.50
	Industrial or Hotel Range - per unit	2.00
	Space Heater	.50
	Gas Steam Radiator	1.00
COMMERCIAL:	Conversion water heating - Multi-family	5.00
WHOLESALE:	Gas Refrigerators (old Buildings only)	1.00
	Gas Refrigerators with Ranges (old buildings only)	1.00
	Laundry Dryers	1.00
	Ranges	.40

Productive lead compensation is paid to the employee where there is no prospect record in the Sales Division Office and where no lead has been previously received from another employee or from a cooperating dealer or tradesman, or where the appliance is sold to a cooperating dealer or tradesman at a trade discount.

All leads should be submitted in writing on prospect claim cards (form N.B.39) and sent to the Chief Clerk, New Business Department, 180 Remsen Street. These prospect claim cards can be obtained on requisition from the Stationery Department. In order to be eligible for a lead it is necessary that the employee has actually interviewed the prospect before turning in the prospect claim.

The more productive prospect claims you turn in, the more compensation you receive and at the same time you are doing your part in increasing the Company's business.

Yours sincerely,

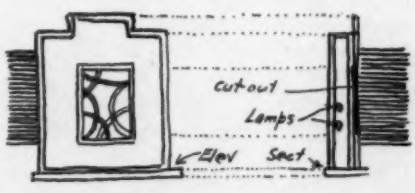
Hugh Cuthrell.
Manager.

If it's done with HEAT
YOU CAN DO IT BETTER WITH GAS

THE most successful salesman of electric ranges we ever heard of did not know a thing in the world about the "mechanics" of the electric range, but boy! what he did not know about cooking good old every day grub on an electric range was not worth while learning. He made a success where experts failed for he could talk about cooking electrically and he could cook that way.

He spent hours, it is said, in the kitchen having his wife teach him how bread, biscuits, meats, and all manner of things that "Just folks" eat every day were cooked and when he went out to sell—no—not ranges but electric cookery; he made a success of it, for he was able to talk in the language of the cook. Does this bring up any questions in your mind about selling gas ranges, water heaters or any other gas appliance?

REVENUE, The Magazine of Light, for June, published by the Edison Lamp Works, General Electric Company, contains several articles that should prove very interesting and valuable to men of the gas industry who are interested in decorating with light, and building inexpensive yet modern store fronts, built-up modern window backgrounds and a number of other ideas all of which are employed to attract folks to the store.



How Come!

HYLAN PIPER

THE representative of one of the big stove and range manufacturers dropped in, a few days ago and after exchanging the usual pleasantries, passed out a two-for-a-quarter cigar and settled down to talking shop. "How's things, anyhow?", we asked. "Well," came the reply, "they are what you might call spotty. Where the principals are riding the sales manager for volume everything is uncertain. On the other hand, where the policy is to go along and build up new business not alone on ranges but on such items as water heaters, clothes dryers, incinerators, and refrigerators, we are getting a very nice lot of business. The funny thing about it all is that these fellows are not devoting nearly so much time, thought and newspaper space to advertising ranges as they did five or even two years ago; I mean those who are under high-pressure control and who are going after volume.

Declining Sales Volume

"Now, I had a case the other day. I called on a man who bought twelve hundred of our ranges in 1927, and sold them, along with a lot of another manufacturers and who started off the first half of 1928 at about the same speed, but slowed-up during the last half of the year, and this year has not dented the market. When I talked to him about it he said: 'Well frankly I do not know the reason for it, unless it is that we have had to revise our prices and feature a lower priced range than you folks could furnish us. You know with all this chain store competition and the furniture stores going after things like they are, we can't hold our dollar volume unless we sell the kind of stuff they do. It's for that reason that we have featured a lot of things that we have. We have to show a dollar volume.'

"This kind of talk did not seem reasonable, yet I could not say anything, but I decided to do a little investigating on my own hook, to see just how deep the furniture men, the department stores and the chain stores were digging into his range business. I remembered that when we first sold the gas man ranges we had an account in his town, with a furniture store, that had been pretty active, but which we more or less let die on account of the fact that we felt the gas company would do a better and bigger job for us. However, our relation with the furniture house had always been cordial and satisfactory in all other respects. Remembering this, I paid our old customer a visit and after chatting a while, I asked him how his stove and range business was going, although I had noticed as I entered the store that the window which had formerly contained a display of ranges was now given over to the display of a mechanical refrigerator, and the space up-front, where it formerly had been his habit to display ranges, was now occupied by a number of radios and coffee tables. 'The range business,' said the furniture man, 'oh hell! we don't monkey around with it much any more. You see it got to be such a hard game and the gas company got to giving away so many things with a range that we just decided to discontinue aggressive selling and cut our stock down to where it is now; what you see there in the back, three or four ranges, so if any of our customers insist we can furnish them with a range. As far as going after the range business like we did a few years ago, we just lay our money to advertising furniture and specials. Besides, always having to contend with that sort of selling, we were also confronted with long time payment plans, allowances for old worthless merchandise and we just decided to get out of the business entirely. At that, we did dislike giving up our range business which had grown to be a nice one, as you know. We do feature a number of electric appliances now, and we are thinking some of taking on an electric range. The local power company has done a lot of range advertising lately and we have investigated their methods and we feel that we can go along with them without fear of unreasonable terms or allowances barring our way and we can meet their time plan too, which is much shorter than that offered by other range dealers.'"

This story is recited in order to illustrate how a great many dealers feel about the appliance business. The dealer is in business to get all the business that he can at a profit, yet, like all of us, if any line causes him any great amount of grief, he is pretty apt to throw it over-board. A great many dealers are of the opinion that the gas man does not carry merchandise for a merchandise profit, but simply as a means of selling a commodity. This is especially true so far as the range business goes in many communities. At any rate, that is the way a great many dealers view the situation and the way a number of gas men look at it. It seems that if the gas man would work out a co-operative plan to secure all of the gas range business that exists in his town through a co-related activity with the good dealers, instead of trying to get it all himself, far more ranges would be sold. Any such plan should take into consideration only the sale of approved ranges at prices and on terms that would give a profit with each sale and entirely eliminate any premium as a part of the sale.

Suggested Remedies

Such a plan could then be extended to cover other appliances that have ready acceptance in the home and the gas company could then devote a greater amount of its time to promoting other load building appliances that are not so well known. In building up the sale of such appliances, the gas man might well resort to free trial installations, low or no down payment, and long extended payment plans; to window displays, store and public demonstrations, etc. This does not mean that the gas man should slacken his efforts to keep the gas range sold, but that he should strengthen them by getting more outlets for the sale of ranges. Too, he should do a certain amount of advertising and at all times display and sell first class ranges and continue home service activities in the way of cooking schools, the preparation of recipes and menus and assisting and educating the woman in the home in matter of food preparation and cooking.

In a number of places, the gas man has taken a step in this direction and it will be very interesting to learn what results accrue from his efforts and just how the sale of ranges in these communities hold-up; whether they show an increase or a decrease in sales. In some instances, the gas man is even supplying the dealer with stocks, advertising for him, in connection with their regular advertising and carrying a certain amount of the dealer's paper.

Successful Househeating Selling

FREE installation of gas heating equipment for Atlanta homes is being carried on with great success by the Atlanta Gas Light Company, which

reports from twenty to thirty installations a week.

Realizing that the use of gas for heating purposes was practically unknown in Atlanta, the Atlanta Gas Light Company decided upon the plan to introduce it, with marked success. Installations are being made free of charge, and if they are not satisfactory, the gas company promises to take them out.

If on the other hand, the installations prove satisfactory, the owners may pay for them after the tests have been completed, in the Spring.

A factor in the success of selling gas heating apparatus has been the special training of salesmen for the work. The salesmen are trained to estimate the heating requirements of a home, the type of gas heater needed and other data before they are sent out, and make the sale of home heating a part of their regular work.

It is expected that several hundred gas heaters will be installed before fall in Atlanta alone.

Gas Sales Statistics

PAUL J. IMSE

Milwaukee Gas Light Co.

STATISTICS are regarded as a way of handling numerical facts, rather than merely accumulating numerical data. Therefore, the accumulated data must be analyzed and segregated into related units and then follow with theorizing as to the presentation of facts.

Let us apply the foregoing to Gas Sales. We all have volumes of primary data concerning this, the principal unit which produces our revenue. This data when summarized for the month or accounting period gives a sum which is used as a base, in numerous calculations, for comparative operating costs.

To make this summary or accumulation more valuable, we can also keep a record of the monthly sales in the various blocks of the rate steps. A simple analysis of this sort not only relates to the management the ratio of each block to the total and whether the rates are proper revenue producers, but also, whether they are an incentive for greater use of gas by the customers.

A Valuable Analysis

A further analysis of sales and one very valuable to the Department for Promotion of Business is a summary of sales by various classes of use. There are four primary classes which we all recognize—viz: Residential, Commercial, Industrial and Househeating. These can be made more valuable if divided according to the nature of use.

The Residential sales, for instance, could be sub-divided to give data on: Residences, Apartments, and Rooming and Boarding Houses.

The Commercial customers could be advantageously divided into two major classes—viz: "Commercial" and "Hotel & Restaurant" customers;

The Commercial customers would include all mercantile establishments and offices. A suggestion for a classification of these customers follows: Retail Bakers, Meat Markets, Laundries, Cleaners and Dyers, Stores, Offices, Etc.

The Hotel and Restaurant customers would include: Hotels, Institutions, Schools with Kitchens, Restaurants, and Hospitals.

The Industrial customers are those who use gas in their manufacturing processes. We have: Brass, Iron and Steel Foundries, Shoes and Leather Goods Mfgrs., Paint & Varnish Mfgrs., Newspapers and Printers, Manufacturing Chemists, Etc.

Househeating customers are those who use gas for complete all-gas heating installations.

A study of local conditions would present fundamental data which is related either directly or indirectly.

We may have local conditions which affect Residential sales in different seasons. Some communities have access to an abundance of cheap fire-wood for range use, which causes a drop in gas sales in cool weather. Some companies serve summer resort property which increases their sales in the summer months. Others have a continuous increase in sales, however, the ratio per customer is declining, the cause being a steady increase in the number of apartment house customers. Such a condition will cause a decrease in the net revenue, because apartment house customers usually use an inconsiderable quantity of gas, however, our distribution system property and also the production property must increase with the number of customers, as do the operating expenses of the Distribution and Commercial departments. Therefore, data on apartment house customers would prove valuable.

Commercial customers are, as a general rule, steady users and are not greatly affected by seasons of the year, however, the general business conditions of the community will cause a rise or drop in commercial gas sales. In a large company, business conditions are reflected in, and can usually be ascertained from the Industrial Gas sales. Among the commercial customers we also have those who give us the opportunity to make our plants pay a 24 hour return on our investment, and expenses incurred, for giving continuous 24 hour service. We have the Hotels and Restaurants who are on the job early in the morning to prepare for their breakfast customers until late at night for after-theater lunches, etc. Then the bakers come on with the night baking load. We also have the Auto Service Stations who do car washing at night. Data on the relation of these sales to the total for the year, season or hour of demand are valuable to the sales manager, for the reason of pointing to possibilities of building up a better load and also to the management for rate adjustments.

Seasonal Demand Customers

Industrial customers as individuals, consume the greatest quantity of gas. However, numerous concerns have a large seasonal demand which make diversified loads necessary for an economical investment turnover. An analysis of industrial sales according to classified industries is a great help in solving the problem.

The Househeating load is still in its infancy. Because of its large seasonal demand, strenuous efforts are being made to offset the winter load with a seasonal summer load. Water Heating in apartments and other large buildings where a coal fired boiler is used for heating water in winter, and the gas fired refrigerators are the principal units we have at present to offset the Househeating load. An analysis of consumption of present installations of this nature will prove the soundness of this theory.

For comparing the trend of sales with those of the entire industry, we can refer to the statistical bulletins of the American Gas Association. Bulletin No. 7, for instance, gives us an analysis of the annual sales for the past ten years and also some data on monthly variations. A further implication of relationship suggests comparison of the data for different periods or with other departments or companies. Statistics would be barren if they dealt with individual units only. A single month's analysis of gas sales by one company would have little value to one not intimately acquainted with the particular company, and, if he were, the chances are great that some vital fact is missed or overlooked. Whereas, if this analysis is presented with a comparison to a like season, period or to trend, it naturally presents itself for meditation.

Presentation of Data

We find from the experience of others that comparisons of gas sales should be made with like seasons, months, or days of the week, rather than with dissimilar periods even though the space of time is equal. A variation in temperature affects the sales considerably and. because the mean temperatures for like months of each year vary but little, all of us have accepted and adopted the method of comparing the monthly gas sales with those of the same month in the preceding year.

Abstract of a paper read before Wisconsin Utilities Association, Accounting Section Convention, Eau Claire, Wisconsin, June 19 and 20, 1930.

When the sales analysis of the classified establishments are thus compared, the Sales Manager can immediately detect the weaker spots and attempt greater sales promotion or through continuous contact with the customers he probably anticipated a drop for reasons such as our late depression, or the rebuilding of furnaces and the like in some large manufacturing concerns.

It is assumed that the sales manager's vigilance is not only attracted to a decrease in sales but by the fact that a particular industry is falling below the anticipated trend of increase.

When we analyze the expenses and efforts of the Credit and Collection Departments whose work is closely related to gas sales but whose duties are only increased by the additional number of customers, we find that it is more proper to compare months of the same year, or rather to illustrate the costs in regular monthly sequence.

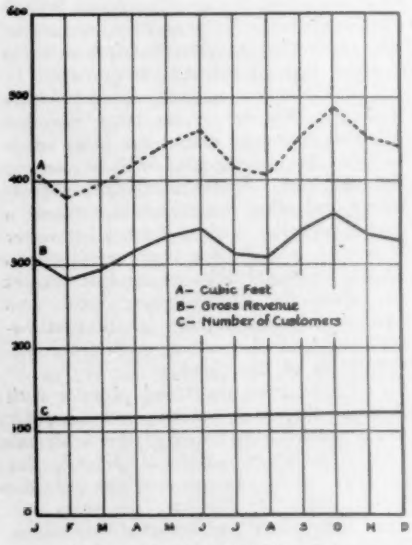


Chart 1—Residential Gas Sales

A review of these examples gives evidence that all matters of information should be carefully studied before being presented as a statistical record. It must be observed that all items are free from bias either voluntary or involuntary and that resulting statistics will also increase in value in proportion to the time or number of observations covered.

The collection and compiling of statistics would be senseless unless they give some valuable information about the present position of a business and the direction it is headed. It naturally follows that they should be reduced to a form that will give this information quickly and truthfully. The average person cannot carry six or seven figures in the mind and at the same time perceive the relative value and position of each. However, this must be done to properly understand a written statistical report. In the case of a picture, the process is much simpler. Most people are "eye-minded;" that is, the eye is quicker than the ear. When you read a printed page you consciously or subconsciously transfer the printed text from lips to ear and from ear to mind. But a picture makes an immediate impression upon the mind.

It is evident, therefore, that when the results of observation have been secured, one of the first steps for interpretation of the data should be that of presenting the results graphically.

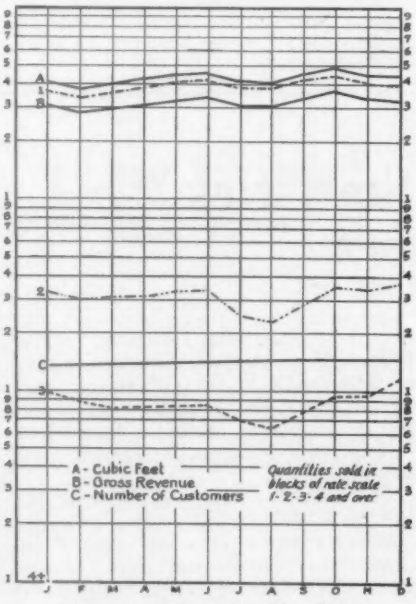


Chart 2—Residential Gas Sales

The type of chart to be used depends upon the data to be plotted, and particularly the purpose for which the chart is made. There is no one method or chart which will serve all purposes, therefore, a good illustration requires a careful study of the accumulated data to bring out certain characteristics or relationships.

For Example:

If the purpose is to emphasize the absolute variation in Gas Sales between different periods, the simple arithmetic chart will serve the purpose. Points representing the monthly or annual sales are connected by a series of straight lines and the completed chart tells a simple story of periodic fluctuations.

If relation or trend rather than absolute variation is desired, the ratio or semi-logarithmic chart will give the proper significance.

A typical curve of the monthly Residential Sales of the Milwaukee Gas Light Company is shown on Charts No. 1 and No. 2.

On Chart No. 1 we have the total sales in Cubic Feet, the Gross Revenue and the Number of Customers portrayed in volume on arithmetic paper. To rapidly analyze this data, we should give consideration to Chart No. 2 which gives the observer who is familiar with the company's business a hint as to the causes and effects.

If we take January as normal, the drop in February is caused by the difference in the number of days in the month. March, having the same number of days as January, should therefore rise to the same level. However, upon further analysis, we find that our meter reading schedule also gave us a short month for registration. April, May and June bring on the water heating load besides short auxiliary heating periods. July and August have the vacation slump. You may ask: Why is the summer load about equal to the January total? If we follow the customer trend line we find a steady increase in the number of customers which will partly offset the vacation shut-offs, but the great counter-volume comes from the steady use of water heaters during this period.

Then we have a decided incline to October, the peak month of the year. In this period we have variable weather conditions when the auxiliary heating load builds up on the regular sales to a mark which we aim to top in future months.

November being a shorter month and also cold enough to have steady heat from the central heating system, will drop from the October peak. However, in this year, the months of November and December were affected by the general business conditions.

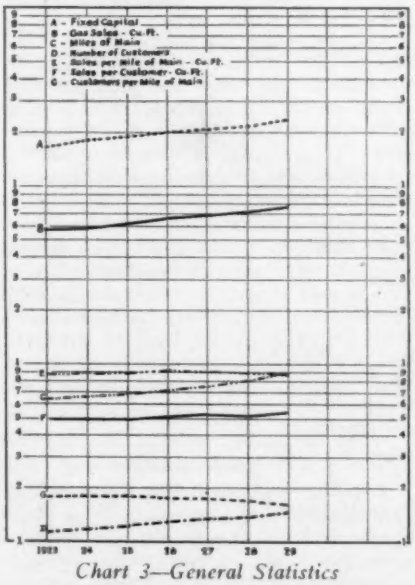

A - Fixed Capital
B - Gas Sales - Cu. Ft.
C - Miles of Main
D - Number of Customers
E - Sales per Mile of Main - Cu. Ft.
F - Sales per Customer - Cu. Ft.
G - Customers per Mile of Main

Chart 3—General Statistics

On Chart No. 2, which is on a ratio scale, the solid lines represent the same data portrayed on Chart No. 1. We see the peaks and valleys leveled to a point of relationship rather than volume. On this chart, the quantities sold in the various blocks of the rate scale can also be plotted to show their relative percentage to the total sales and thus we arrived at the aforementioned conclusions regarding the summer load. In the first block you will find that the percentage of sales to the total is higher in July and August than in any other month of the year. You will also note that the following blocks have decided slumps in these months because numerous customers whose consumption enters into these steps close up their city homes during the summer months.

To portray the trend of the business, we have Charts No. 3 and No. 4.

Chart No. 3 on semi-logarithmic scale shows the trend of Fixed Capital, Gas Sales in Cubic Feet, Number of Customers, Miles of Main and the Sales per Mile of Main, Customers per Mile of Main, and Sales per Customer.

Close observation shows the sales to follow the trend of Fixed Capital. By placing a scale on the chart we find the trend line of the miles of main rising more rapidly, and the number of customers not keeping up with the trend of Fixed Capital and Gas Sales. One reason is that the area of the City of Milwaukee is rather densely occupied by residences and factories which accounts for the large number of customers we have per mile of main. However, since the war, we had quite a large expansion in residential territory which required extraordinary large main extensions and not until these sections are well populated will we see an incline in the trend of sales per mile of main. Another reason is that in some streets we laid a double line of main, which in some instances was required because of municipal regulation and in others because of an economic reason.

On Chart No. 4, the actual trend of Gas Sales, Miles of Main and Sales per Mile of Main is imposed on the actual data.

The method of computing the trend, which most nearly represents the line from which deviations of the actual data are a minimum, is given in exacting detail by Mr. Paul A. Ryan, Statistician of the American Gas Association, in his paper on "Fluctuating Statistical Standards for Gas Utilities," given at the 1928 convention of the American Gas Association.

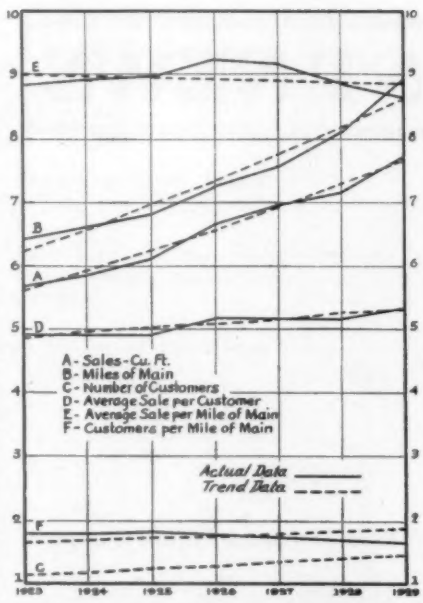

A - Sales - Cu. Ft.
B - Miles of Main
C - Number of Customers
D - Average Sale per Customer
E - Average Sale per Mile of Main
F - Customers per Mile of Main
Actual Data
Trend Data

Chart 4—Gas Sales Data with Related Trend

Greatly Increases Sales

Gas Refrigerators a Boon to the Industry in More Than One Way

JOHN H. HARTOG

IT is interesting to note how the Gas Refrigerator has not only helped to increase the gas consumption and far more so than was at first expected, but also to reduce the New Business expense or Merchandise losses, or else, what is still better, increase the Merchandise profits, all of which however means the same thing in the end, inasmuch as Merchandise profit or loss is so closely interwoven with New Business, Good Will and Retaining-old-business expense, that it makes it difficult to draw the line.

In our own case the sale of Gas Refrigerators added one third to the volume of total appliances sold during the first four months of 1930 compared with the same four months last year and that the trend is towards a still greater average increase, is shown from the following figures:

Gas Refrigerators Sold		Adding % to Merchandise Sales
Jan.	$4,422.66	19.2%
Feb.	8,468.89	32. %
Mar.	8,457.09	22.4%
Apr.	17,803.13	52.4%
First 4 months of 1930	39,151.77	32.3%

The increase for the entire four months of 32.3% compares with an increase in the same period of 1929 of 18.9%

Entirely aside from this gratifying showing, there is the fact that apartment buildings which desire to modernize and install refrigeration now, do not have the incentive placed before them to exchange their Gas ranges for electric ranges, but can add Gas refrigeration to the ranges they already have or buy new Gas ranges at the same time that they install Gas refrigeration.

Another interesting phase is that the Gas Company's investment doesn't lie idle to so great an extent because without refrigeration a very large percentage of the apartments are vacant, which vacancies generally disappear as soon as modern refrigeration can be offered to prospective tenants.

New Refrigeration Principle

Dr. Daniel F. Comstock, president of Comstock & Westcott, research engineers of Boston, Mass., former member of the faculty of the Massachusetts Institute of Technology and principal inventor of the Technicolor process for making colored motion pictures, has announced the invention of a new method of refrigeration which, in addition to performing the usual function of preserving food, is uniquely adapted to the cooling of homes and small business buildings.

This new system has been developed after six years of research under the direction of Dr. Comstock and Mr. Lyman F. Whitney, of the firm's technical staff. Exhaustive tests of the new device indicate that the cooling of dwellings and other small buildings will shortly be an everyday reality.

The new machine is known as the Stator and employs a mercury aspirator in conjunction with water as a refrigerant to perform the same function as the motor and compressor in most of the mechanical refrigeration systems. All moving mechanical parts have been eliminated.

The essential principle is simple and consists of the following steps: A miniature mercury boiler causes mercury vapor to be discharged into a venturi tube, entraining and compressing water vapor drawn from the cooling unit. In the resulting partial vacuum the water in the cooler evaporates rapidly, producing refrigeration. The heavy mercury is used to pump the water back up to its original height, while itself flowing back into the boiler.

Columns of liquid are employed to balance the slight pressure differences in the system, while permitting the flow of the liquids. Thus, mechanical valves are eliminated. The internal pressure is always below the pressure of the outside atmosphere, assuring great safety of operation. This "low-pressure" system has its partial vacuum steadily maintained by an ingenious arrangement incorporated in the machine.

The first unit, designed for domestic food refrigeration, is air-cooled, and needs only to be connected with the local supply of power. This domestic unit, and the larger house cooling units which will follow as soon as possible, are gas-operated.

In homes equipped with the air-cooling machine it will probably be necessary on very hot days to keep the windows closed to prevent the cool air inside the house from escaping. All the air distributed by electric fan pressure throughout the house can be filtered and "conditioned" as well as cooled by the system.

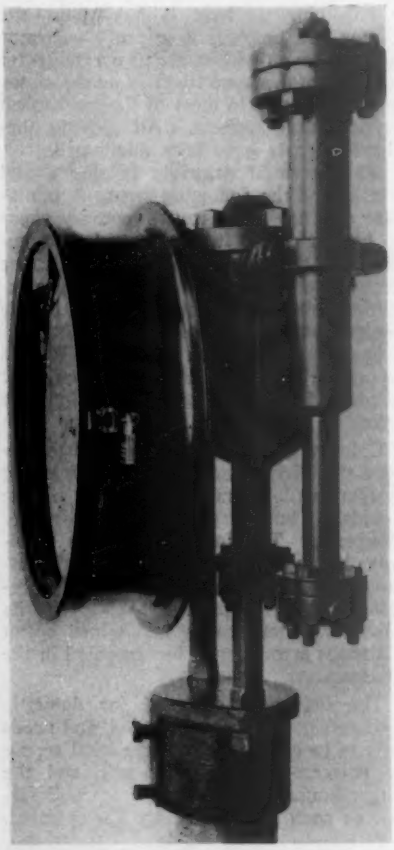
Bigger and Better Gas Business

The Southern Union Gas Company is building a natural gas pipe line from the Kutz Canon structure in San Juan county, New Mexico to serve Belen, Santa Fe, Albuquerque and other New Mexico cities with natural gas, and when the New Mexico service is operating it is likely the main will be extended into Arizona.

EQUIPMENT NEWS

Foxboro Turns Out Two New Flow Instruments for High Pressure Work

The Foxboro Company of Foxboro, Mass., has just brought out a new high pressure Recording Flow Meter and Flow Controller. The new instruments are built for operating pressures of 2,500 lbs. per sq. inch. They serve as companions to the previously announced Foxboro High Pressure Flow Meters and Flow Controllers for 5,000 lb. pressure applications.



Single Pen Recording Flow Meter

The illustration shows a single pen 2,500 lb. Recording Flow Meter. If static readings are needed a two-pen instrument with static element is furnished. When total flow readings are desired an integrator can be supplied on the instrument. The integrator is a Foxboro product and gives the flow readings without the use of any multipliers.

The new Flow Meters and also the new Flow Controllers can be mounted in place without the use of loading devices. This makes them particularly adaptable to modern field service conditions.

All parts of the new instruments are specifically designed for high pressure applications. All working parts are drop forgings.

Descriptive matter will be mailed on request.

Hills-McCanna Liquid Sampler

The Hills-McCanna Liquid Sampler provides a means for obtaining an accuratae, composite sample of practically any fluid, quickly and easily. Samples from three levels of tanks or tank cars are obtained in a single operation. Even the extreme bottom of the vessel is reached.

The Sampler has found wide use in all types of plants, handling large quantities of bulk petroleum and vegetable oils, etc. Light or heavy liquids may be tested, whether for the purpose of examining incoming goods against purchase specifications, or checking the quality of liquids in process of manufacture.

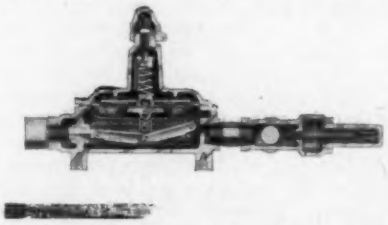
The Sampler operates on the single plunger suction principle. It consists of a hollow metal cylinder 13½ inches in length made of non-sparking metal. A close fitting piston without packing operates on the inner wall of the cylinder. Interchangeable nozzles for handling liquids of varied viscosity are provided for the outlet in the lower end of the cylinder.

The Sampler is lowered into the tank or vessel to the desired depth by means of a length of chain attached to its upper end. A second length is fastened to the plunger rod. This rod is notched at three equidistant points, dividing the cylinder into three parts of equal capacity. By drawing the chain attached to the plunger, liquid is sucked into the lower third of the chamber. The operator is informed when this portion is filled by contact of the upper notch on the plunger rod with a spring ball set in the cylinder neck. The Sampler is now raised to a second and third position where successive samples are obtained in the same manner, filling the sampler to its full capacity of 32 ounces. The operator has now obtained an average, composite sample of the contents from the extreme bottom, middle and upper portions of the vessel. By analyzing this sample the exact quality of the liquid is determined.

Further details concerning the Sampler and a copy of the bulletin giving specifications, may be obtained by addressing the Mills-McCanna Co., 2349 Nelson St., Chicago, Illinois.

Announce New Gas Control Unit

Model 30 Reynolds Gas Control Regulator is especially designed for bottled gas installations. This Gas Control unit is the result of extensive research, as to the specific requirements demanded for this type of work. Size, strength and accuracy were factors which received careful consideration of the Reynolds engineers.

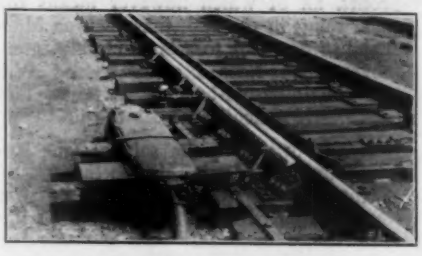


Two sizes (No. 0—No. 1), give uniformity and efficiency in gas regulation. No. 0 is recommended where the maximum volume of gas required does not exceed 150 cu. ft. per hour. No. 1 is for installations where the volume required is in excess of 150 cu. ft. per hour. The difference in these two units is—size and connections. Strength—Model 30 is built to handle an inlet pressure of 300 lbs., reducing same to inches of water. But to give adequately safety margin the materials used in both sizes will stand pressure in excess of those specified.

Because of the high inlet pressure and low outlet pressure close machining limits on various parts are required. This assures constant accuracy in controlling gas. Very accurately machined toggle leverage is used in this Model 30, which gives an absolute closing power ratio. This Regulator was designed and built by Reynolds Gas Regulator Company, Anderson, Indiana.

New Gas Switch Heater

A new development has recently been announced by the Chausse Oil Burner Company of Elkhart, Indiana, by way of a gas switch heater with electrical ignition so that an entire yard equipment of heaters can be turned on and put into operation from a central point, such as a signal tower. These heaters are shown in the attached photographs. The heater itself is 14 ft. long, placed close to the ball of the rail, and held in position by substantial malleable iron clamps which



Chausse Gas Switch Heater

are attached to the ties. The gas enters the switch heater at the center and is distributed along the rail through a well designed combustion chamber. This keeps the rail temperature well above the melting point of snow and ice with very little appearance of flame. There is, therefore, no interference with low signal targets and no danger of burning ties or wire insulation.

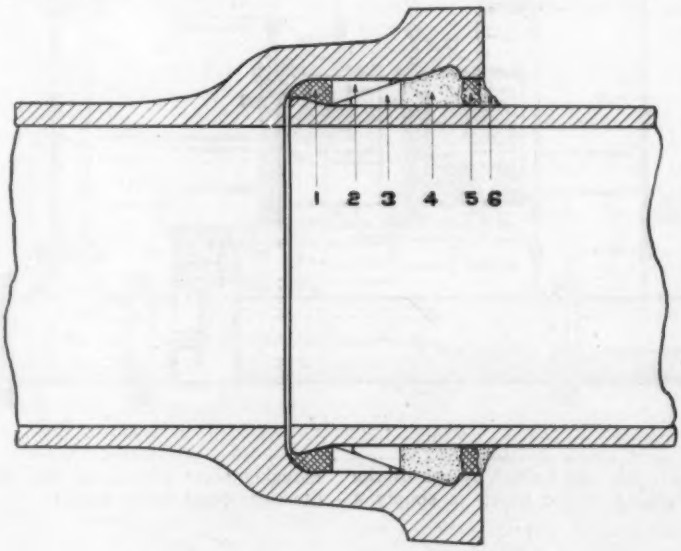
The ignition apparatus consists of a nichrome wire igniter, wound on lava spool and contained in a sheet steel housing and controlled from any central point for an entire switch lay-out.

The average gas consumption under normal conditions would be about 75 cu. ft. of free gas per switch heater per hour, or 150 cu. ft. per switch. The electric consumption if the igniter is left on constantly amounts to 220 Watts per switch heater, 440 Watts per switch. This igniter can either be left on constantly in severe storm or could be turned on for a few minutes in starting and then turned on periodically by the tower man to assure complete operation of all the heaters at all times.

The manufacturer of these switch heaters, the Chausse Oil Burner Company of Elkhart, Indiana, will give additional information to gas companies concerning this equipment or have one of their representatives visit steam railway men in company with the gas salesman to assist in developing this business.

Wedgetite Rubber Rings

The American Cast Iron Pipe Co., Birmingham, Ala., recently issued a 4 page bulletin describing "Wedgetite Rubber Rings," with cast iron bell and spigot pipe. Figure 2 in the illustration shows the bottom ring firmly seated on the jute. Figure 3 is top ring. Figure 4 is cement, 5 yarn to drive cement and 6 cement facing. These rings are for both low and high pressure gas. Copy of bulletin will be mailed on request.



Automatic Ratio Control

A Ratio Control for the mixing of gases or liquids in any desired proportion has been announced by Bailey Meter Company of Cleveland, Ohio.

This control finds many applications in industries where mixtures of fluids must be definitely proportioned in a given ratio to secure the best results.

Air and fuel for combustion in industrial furnaces may be automatically proportioned by this control so as to secure maximum fuel economy. A control of this kind can be applied to both liquid and gaseous fuels or to a combination of the two in such a way as to insure the highest combustion efficiency consistent with economical operation. Mixing of two or more gases or liquids to form a low cost fuel can also be accomplished by this control.

Fig. 1 shows an installation of Bailey Ratio Control in an eastern steel mill, where it is used to automatically proportion blast furnace gas and coke oven gas. Blast furnace gas in itself is too lean and low in heating value to make a satisfactory fuel. Coke oven gas is too valuable to use by itself as a fuel but a mixture of two parts blast furnace gas to one part coke oven gas forms an ideal low cost fuel. This mixture is maintained by the Bailey Ratio Control.

Figure 1

As will be noted from Fig. 2, the control is operated by hydraulic pressure. Any change in the rate of flow in the coke oven gas line is immediately reflected by the Bailey Gas Meter connected to that line. The recording mechanism of this meter is connected through a system of linkage to a pilot valve, stabilizer and Bailey Gas Meter, which meter is in turn connected to the blast furnace gas line. If the flow of coke oven gas increases, the linkage moves so as to raise the pilot valve, allowing oil pressure to be applied to the "more" side of the power cylinder. At the same time, this movement opens the "less" side of the power cylinder to drain. The stabilizer tends to counteract the impulse given by the coke oven gas meter. This counteracting effect of the stabilizer is secured by connecting the "more" oil line to the upper chamber of the stabilizer and the "less" oil line to the lower chamber of the stabilizer. As pressure is applied to the "more" oil line and the "less" side is open to drain, the stabilizer piston moves downward and tends to return the pilot valve to a neutral position which in turn tends to equalize the pressures on either side of the stabilizer, causing it also to take a neutral position.

The stabilizer permits of a quick acting control which does not over travel or hunt.

Any desired ratio between the two component parts of a mixture can be secured by selecting the proper ratios for the meter orifices. A further adjustment or

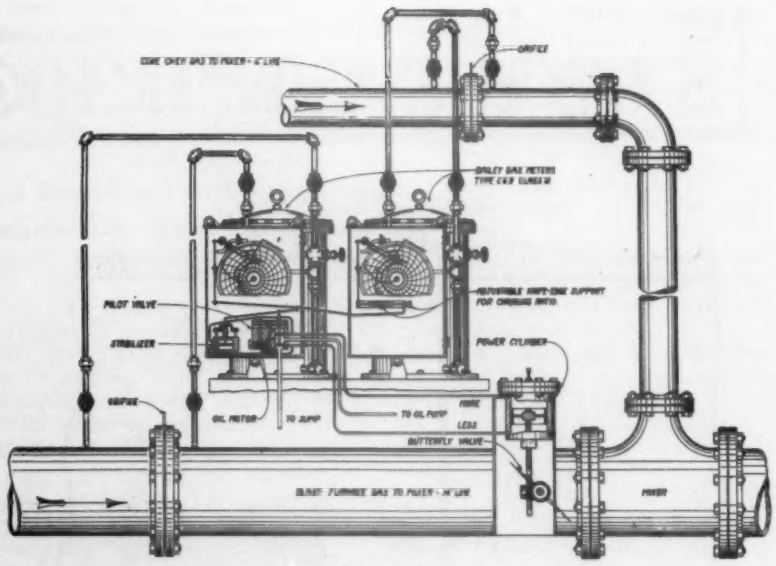


Figure 2

change of ratio can be had by use of the ratio changing device which is simply a movable pivot supporting the linkage in the right hand meter casing.

New Compound Effectively Seals Most Stubborn Thread, Flange and Gasket Joints

The Quigley Company, Inc., 56 West 45th Street, New York City, announce the manufacture of a plastic, expansive compound for sealing joints, called Q-Seal.

The compounding of this material was made possible by the discovery of a mineral, a phenomenon of nature, which is not only a natural lubricant and preserver of metal, but when subjected to heat expands to several times its normal volume.

This mineral is ground to a very fine mesh and used as the principal pigment in the compounding of Q-Seal. The principal vehicle or mixing agent used is one that is impervious to crude oils, all of their derivatives, acid, etc., and is non-corrosive.

Q-Seal is said to be easily applied to joints to be sealed with a brush. The expansive qualities fill any imperfections in threads, flanges or gaskets. The compound seals joints leakproof, prevents rust and corrosion. Joints fabricated with it may be broken with ease regardless of age or conditions they have been subjected to. The compound is very economical to use.

NEWS OF THE GAS INDUSTRY

Gets Permission to Build Natural Gas Line

The Public Utilities Commission of Colorado granted A. J. Hardendorf of Lamar, Colorado, permission to build a natural gas pipe line from the Stevens county Kansas field to Baca and Prowers counties Colorado, serving the towns of Lamar, Holly, Wiley, Granada and Bristol in Prowers county and the towns of Springfield and Walsh in Baca county. The line will cost about $600,000, and in addition of more than $100,000 for laying pipe in the cities named.

Texas Gas Utilities Plans Further Developments

Plans are under way for the construction of additional main natural gas pipelines by Texas Gas Utilities Company, subsidiary of Appalachian Gas Corporation, it was announced by Ross Holmes, chief engineer of the company, with first ground to be broken before the end of the month.

The first construction will be that of the Crystal City extension, to connect with the main pipeline linking the Uvaldo Field with the city of Uvaldo, which has been in operation for some time. The second section of the work will carry the line through the "Winter Garden" district of Texas, connecting a number of cities and towns, including Carrizo Springs, Asherton and Caterina.

This will give the company two main trunk lines, one tapping the Chittim Field and the other the Uvald Field. A future development of the construction program calls for the linking of the two fields for the purpose of securing maximum productive capacity.

Midland United Company Awards Medals for Life Saving

The second annual awards of Midland Utilities Medals for life-saving to employes of subsidiaries of the Midland United company were announced recently.

The following four men all of whom are employes of the Northern Indiana Public Service company, will receive the awards in recognition of great public service in saving human life: Charles W. Bennett, Lafayette; Lawrence B. Nelson, Fort Wayne; Walter Lee Wahlsmith, Hammond; Joseph H. Reiser, Michigan City.

The medals, are made of silver. Each medal is enclosed in a leather case on the outside of which is stamped in gold letters the name of the recipient.

New Pipeline for Memphis Natural Gas Company

Memphis Natural Gas Company, through D. C. Shaffer, general manager, announces commencement of the work of laying a new fifty-mile pipeline to conduct natural gas from its main Louisiana-Memphis line to various communities in Mississippi, including Leland. Indianola, Morehead, Ittabena and Greenwood. Memphis Natural Gas Company will supervise the engineering in connection with the new line, while actual construction work is being carried out by Phoenix Utility Company, the construction unit of Mississippi Power & Light Company.

The new line connects with the main transmission line at a point near Greenville, Miss. It is 8⅝ inches in diameter, with electrically-welded joints and with a Dresser coupling every 500 feet. A thirty-foot right of way is owned, the clearing of which is nearing completion.

The terrain traversed is undulating delta land with no unusual construction features, but because of lowness and slight natural drainage, and a high average rainfall, a deep, well-covered, thoroughly sound line is required. The line will cross the Bogue Phalilah, Sunflower and Yazoo rivers, low during certain seasons of the year, but which, like all Southern rivers in the Mississippi basin, carry an enormous amount of water during the late Winter and early Spring.

Multiple-crossings will be used at the rivers, consisting of two six-inch lines anchored with 750 pound river clamps. Each pair of lines will be tied into the main line on either side of the river by headers, and each line will be equipped with gate valves.

Michigan Gas Companies Continue Extension Work

Michigan gas companies are extending their high pressure transmission lines close to 315 miles and are taking gas to more than 20 communities which hitherto have had no gas service, according to mid-season construction reports received by the Michigan Public Utility Information Bureau.

This extension work is a continuation of the expansion programs inaugurated intensively several years ago by Michigan gas systems.

Towns to which gas has already been taken as a result of this year's construction activities or to which it is to be taken before winter comes, include: Brighton, Haslett, Leslie, Linden, Imlay City, Almont, Attica, Oxford, Orion, Mulliken, Sunfield, Woodbury, Portland, Vermontville, Nashville, Woodland, Lake Odessa, South Ionia, Portage Center, Vicksburg, Schoolcraft, Utica, Fair Haven and Anchorville. In addition, lines have been laid to serve the suburban territory of various cities, including Detroit and Grand Rapids.

By the end of the present year, it is expected that the aggregate mileage of high pressure mains in the state will reach 2,255 miles, serving 205 outlying communities, in addition to 63 cities which receive gas from plants close at hand.

The bulk of this season's expansion work is being done in the Central and Eastern Michigan territory served by the Consumers Power Company as indicated by the list of towns given above.

Some other systems which have been particularly active during the past several seasons have completed most of their immediate high pressure extension programs and are devoting their energies this summer to the consolidation of their territories.

Natural gas is still an uncertainty for Michigan. No available and dependable supplies are as yet in sight. Should gas in commercial quantities be found in the drilling explorations now going on, particularly in the Mt. Pleasant area, the network of high pressure mains will be ready to serve as a distribution system. Regardless of what the future may bring forth they now make available a manufactured gas supply to approximately 3,300,000 persons of Michigan's 4,818,371 population.

Gas Company Occupies New Building

The new 20-story, $1,500,000, Milwaukee Gas Light Co. building has been opened to the public. For several weeks the company moved its possessions from the old structure to the new, which is considered one of Milwaukee's finest business buildings.

The new building has attracted a great deal of attention because of its modern form and striking beauty. The upper stories are set-back, conforming to modern building practice in other cities. Unique not only in form, but also in coloring, the building is a valued addition to Milwaukee's growing skyline.

This structure, from the top of which all Milwaukee can be seen, as well as miles of Lake Michigan, is of sturdy construction. The lower course is dark granite, followed by gradually lightening reddish brick, until at the topmost portion the building approaches pinkish shades in the sunlight.

All departments of the Gas Company are housed in the new quarters and occupy all but four floors out of the twenty in the building.

The Milwaukee Gas Light Co. began operations 78 years ago, in March, 1852. R. B. Brown is president, and Ewald Haase vice president, and general manager.

Convention Calendar

September

9-12 Pacific Coast Gas Association Hotel Huntington, Pasadena, Cal. Clifford Johnstone, 447 Sutter St., San Francisco, Cal., secretary.

18-19 Empire State Gas & Electric Associaton, Saranac Inn, N. Y. C. H. B. Chapin, Grand Central Terminal, N. Y. C., secretary.

23-24 Indiana Gas Association, Annual Convention, French Lick, Ind. F. W. Budd, Muncie, Ind., secretary-treasurer.

29-Oct. 3—National Safety Council, Nineteenth Annual Congress, William Penn and Fort Pitt Hotels, Pittsburgh, Pa.

October

13-17 American Gas Association, municipal auditorium, Atlantic City, N. J. Alexander Forward, 420 Lexington Avenue, N. Y. C., managing director.

Cities Service Gas Co. Will Increase Capacity of Pipe Line System

The Cities Service Gas Company has announced an extensive construction program which will increase the service capacity for the entire pipe line system. The expansion program which is for the purpose of insuring an adequate supply of natural gas to meet the peak of winter demands in the homes of more than a million and a quarter persons includes the addition of twenty-four new compressor station units of 1,000 horsepower each, or a total of 24,000 horsepower to the compressor stations in three states, Oklahoma. Texas and Kansas.

There will be two new compressor stations at Blackwell and Drumright, Okla. An extension of the Oklahoma City 20-inch line from Dilworth, Okla., to a point south of Wichita will be made this year. The Dilworth-Cambridge 16-inch line will be improved for high pressure service, and fifteen miles of 16-inch pipe will be laid from Independence, Kas., to Joplin, Mo. One of the major important construction projects is the increase of the capacity of the pipe line system in the addition of the fifteen compressor station units along the 20-inch line from the Texas Panhandle to Wichita, Kas., and adjacent territory. Two units each are being added to the compressor stations at Higgins and Tampa, Texas, at Moreland, Okla., and Corwin, Matfield Green and Ottawa, Kas. At Wichita, three units will be added to the compressor station there.

Change to Natural Gas

Artificial gas is being replaced in Evansville, Ind., by the Southern Indiana Gas and Electric Company, having turned natural gas into its mains. At present approximately 17,000 meters are in use in this city. The company's requirements are supplied by the Indiana Southwestern Gas & Utilities Corporation under a ten-year contract. The corporation is supplying more than 10,000,000 cubic feet of gas daily in 25 miles of its producing properties. It now has available more than 44,000,000 cubic feet of open flow gas. It is planning to extend its lines.

New Gas Offices Opened

Formal opening of the building and offices of the West Texas Gas Company and the South Plains Pipe Line Company at Lubbock, Tex., was held recently. General offices of the two firms that serve thirty-six cities with natural gas in the Plains section of Texas, are located in the new building. R. F. Hinchey is vice president and general manager of the two companies; Clarence Minor is manager of the South Plains Pipe Line Company; and W. O. Daniels is manager of the local unit of the West Texas Gas Company.

Principal towns being served by these companies are Amherst, Anton, Abernathy, Brownfield, Bovina, Canyon, Crosbyton, Idalou, Kress, Lamesa, Levelland, Littlefield, Lockney, Lorenzo, Lubbock, Midland, Odessa, O'Donnell, Post, Plainview, Quitaque, Ralls, Silverton, Slaton, Southland, Tahoka, Turkey, Tulia and Wilson.

West Ohio Gas Co. Declares Quarterly Dividend

The Board of Directors of the West Ohio Gas Company has declared the regular quarterly dividend of one and three quarters per cent on the outstanding 7 per cent Class A Preferred Stock of the Company, payable September 2, 1930, to stockholders of record August 15, 1930.

Lift Last Indebtedness on A.G.A. Laboratory

Prominent executives of the gas industry met at the American Gas Association Laboratory, in Cleveland, Ohio, recently to take part in ceremonies which marked the lifting of the debt upon that institution, whose cornerstone was laid two years ago.

Burning Last Mortgage on A.G.A. Laboratory

Burning of a $15,000 mortgage removed the last indebtedness on the Laboratory. This unusual event took place in the courtyard of the Cleveland building. Surrounded by Association officials and the Laboratory staff, B. J. Mullaney, president of the Association touched the mortgage to a natural gas flame and it was quickly consumed amid the enthusiastic applause of more than fifty witnesses.

The ceremonies were brief and were presided over by R. M. Conner, Director of the Laboratory. Those who spoke besides Mr. Mullaney included C. T. Henderson, of Cleveland, who represented R. W. Gallagher, of Cleveland, Chairman of the Managing Committee of the Laboratory, and president of the East Ohio Gas Company; Alexander Forward of New York, Managing Director of the Association, and A. H. Hall, vice-president of the Central Union Gas Company of New York, and a member of the Managing Committee in the early years of the institution.

Absence from Cleveland prevented the attendance of Mr. Gallagher, and the latter's regret was expressed to the gathering by Mr. Henderson.

Other speakers also were regretful over the absence of Mr. Gallagher, who was one of the prime movers in launching the Laboratory and since its creation one of its most loyal supporters. Another staunch advocate of the institution and earnest worker in its behalf before and after its establishment whose absence from the ceremony was noted by all present, was the late Martin B. Daly, former president of the East Ohio Gas Company. Mr. Mullaney said that Mr. Daly's memory was cherished by the industry throughout the country.

United Builds Refugio Line

Immediate construction of a new trunk gas pipe line from the Refugio (Tex.) county field to the Bee county fields and thence north and west to connect with other trunk lines into San Antonio was announced recently by B. M. Nowery, general superintendent of the United Gas Company.

The route of the 18-inch line will run from Refugio northwest to the Pettus field in Bee county, where it will traverse the immense Ray oil and gas properties east of the main production. From there it will run north of Pettus, a 16-inch extension to be built to connect with the Moody-Seagraves gas line, which comes south from San Antonio and vicinity to between Runge and Kenedy. Another arm will run west from the Pettus end of the 18-inch line to connect with the Magnolia's north and south trunk line.

Heavy shipments of pipe for the line already are in Beeville and construction crews are concentrating there, with work now under way. The trunk line will be completed and ready for operation by November 1.

Data On Natural Gas to be Assembled

Preliminary steps have been taken for the assembling and correlation of data now in the United States Bureau of Mines in any way bearing upon the subject of natural gas conservation, in accordance with the resolution on this subject adopted by the Natural Gas Department Convention at New Orleans last May.

Representatives of the American Gas Association and the Bureau of Mines met in Washington several weeks ago and as a result of this conference economic and technological outlines covering the entire range of the problems that might be considered in this connection were drawn up. These outlines, together with a statement of the general purpose of such a conservation survey and study have been submitted to Chairman H. C. Cooper and members of the Main Technical and Research Committee of the Natural Gas Department, as well as to numerous executives of natural gas companies interested in this very vital subject, with the result that the Bureau of Mines has been asked to assign some one of their engineers to the task of assembling and arranging all of the data available for presentation to Mr. Cooper and his Committee in time for them to decide upon the main objective of this natural gas conservation program, which they will recommend to the American Gas Association Convention at Atlantic City in October.

E. L. Rawlins has been designed by Dr. Scott Turner, Director of the Bureau of Mines, as the engineer to handle the work of assembling this information.

High Half-Year Production for Companies Now in Appalachian Gas Corporation Group

Companies located in the Appalachian natural gas field and now embraced in Appalachian Gas Corporation Group produced 5,766,798,000 cubic feet of natural gas during the first six months of the current year, an average of over 31,000,000 cubic feet daily, it is announced by officials of the corporation. Figures do not include Ohio Southern Gas Company nor other companies in Appalachian Gas Corporation Group operating in the Texas, Oklahoma and Louisiana gas fields.

The figures for Appalachian field output include six months' production of Ohio Valley Gas Corporation, Ohio Kentucky Gas Company and West Virginia Gas Corporation, but less than four months' production of Wayne United Gas Company which did not commence deliveries of gas until March, 1930. All of these companies are now subsidiaries of Appalachian Gas Corporation. Also included in six months' production of Allegheny Gas Corporation, in which Appalachian Gas Corporation holds a 36 per cent. stock interest.

(*News continued on page 82*)

GLOVER-WEST
Vertical Retorts

Faribault, Minn.

The Faribault Gasworks of the Byllesby Engineering & Management Corporation showing the Installation of Glover-West Vertical Retorts

WEST GAS IMPROVEMENT CO.

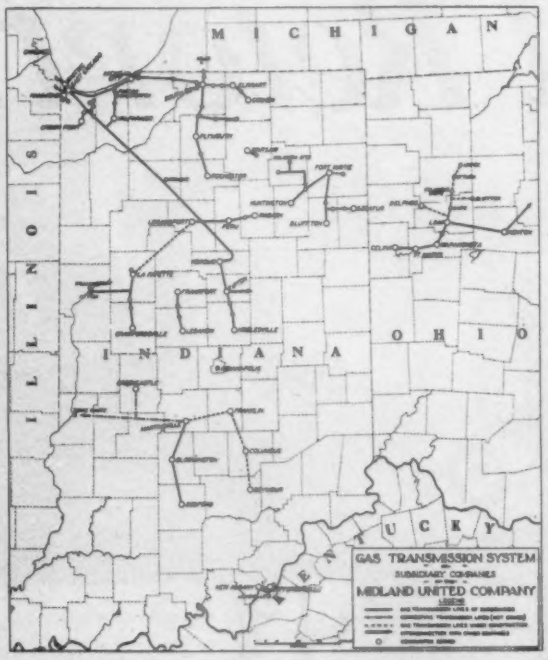
Builders of Coal Gas Plants

441 Lexington Ave. New York

Extensive Pipe Line Program of Midland United Under Way

Further development of the extensive gas pipe line transmission system of subsidiaries of the Midland United Company in Indiana and western Ohio is now underway.

Approximately 185 miles of new pipe lines are being laid which when completed will bring the total mileage up to 841 and will result in the further interconnection of a large number of cities served by subsidiaries in the Midland group as well as the extension of gas service to communities which do not have such service now.



The Interstate Public Service Company is building a 24-mile pipe line from Bloomington to Bedford, a 21-mile line from Martinsville to Franklin and a 40-mile line from Franklin to Seymour by way of Columbus.

The Northern Indiana Public Service Company is constructing a 38-mile pipe line from Logansport and a six-mile line from Fort Wayne to New Haven, which has not had gas service up to this time.

The three lines which Interstate is building are further steps in the development of an extensive interconnected system which that company began last year with the laying of a line between Martinsville and Bloomington.

The most extensive unified system of the Northern Indiana Public Service Company is interconnected with the large gas distributing center at East Chicago. Among the communities interconnected with this system in northern Indiana are Hammond, Whiting, Valparaiso, Crown Point, Michigan City, Hobart, Chesterton, Porter, South Bend, Mishawaka, Elkhart, Goshen, Bremen, Nappanee, Plymouth, Rochester, and Niles, Michigan.

A pipe line also interconnects East Chicago with Logansport, Peru and Wabash. Completion of the line between Logansport and Lafayette will also interconnect Lafayette, Crawfordsville, Attica and Williamsport with the East Chicago gas distributing center.

The West Ohio Gas Company is building 56 miles of additional transmission lines, interconnecting Lima, Ohio, with Delphos, Ohio, on the west and with Columbus Grove, Ottawa, Leipsic, Bluffton and Cairo, all in Ohio, on the north.

West Virginia Gas Corp. to Build New Pipeline

H. E. Danner, vice president and manager of Appalachian Gas Corporation, announces plans for further development of the properties of West Virginia Gas Corporation, control of which was recently acquired by Appalachian Gas Corporation Improvements include laying of a new pipeline, drilling of new wells and interlinking with pipelines of other companies in the Appalachian Gas Corporation group located in the West Virginia natural gas fields.

Work will commence immediately on a new pipeline to conduct gas from the Monickel field in Lincoln County, W. Va. The new line will connect the pipeline of Monickel Gas Company, subsidiary of West Virginia Gas Corporation, extending from the Cabell County field to Huntington, West Va., with the Buffalo Creek field pipeline of Allegheny Gas Corporation. Appalachian Gas Corporation owns a 36 per cent. stock interest in Allegheny Gas Corporation.

All of the gas delivered through the new line will augment the supply of natural gas now being sold under long-term contract to International Nickel Company and Owens-Illinois Glass Company.

Change Name of Company

Officials of the Oakland Natural Gas and Oil Company of Oakland, Ind., have filed papers with the secretary of state of Indiana changing the name of the company to the Oaklandon Gas and Oil Company and increasing the capital stock 125 shares having a declared par value of $25 each.

Central Indiana Gas Co. Announces Expansion Program

The Central Indiana Gas company, which now supplies Muncie, Anderson, Alexandria, Elwood, Fairmount, Marion and Hartford City with artificial gas has announced through its general manager, E. A. Angley, Muncie, a program of expansion.

According to the official statement this will include the extension of this service immediately to every city, town and village within the company's territory. At the same time it was announced that arrangements had been made to supply natural gas to factories through the territory. Approximately $1,000,000 will be expended for additional gas production and equipment and in supplying industries with natural gas. Central Indiana is a subsidiary of the Central Public Service Corporation. Coupled with the statement of the Central Indiana Company's manager is that of Albert E. Pierce, president of the Central Public Service, announcing the latter's entrance into the field of piping natural gas through pipe lines costing $12,000,000 and to run 260 miles from eastern Kentucky natural gas pool to the company's territory in Indiana. Towns that have already awarded franchises to the Central Indiana for artificial gas service include Summitville, Jonesboro, Gas City, Dunkirk, Redkey, Albany, Farmland, Upland, Chesterfield, Frankton, Yorktown, Gaston, Eaton and Parker. The Central Indiana's plans contemplate seventy-eight miles of high-pressure transmission lines and 100 miles of distribution mains. Regulating and metering stations will also be built.

Wayne United Gas Drilling New Wells to Meet Increased Demand

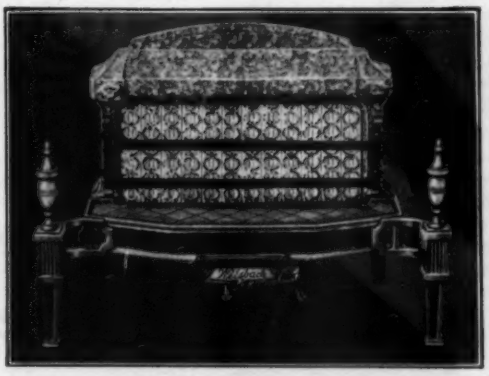
Announcement is made by officials of Wayne United Gas Company, subsidiary of Appalachian Gas Corporation, that drilling of four new natural gas wells in the Wilsondale, West Va., field, will commence immediately, to take care of anticipated increased industrial demand. The work is to be completed by Oct. 1.

The new wells will be connected to the company's general gathering lines system, and their production of natural gas will be sold under existing contracts to the Owens-Illinois and Libby-Owens-Ford Glass Companies' plants in Kanawha City, West Va. Present deliveries by Wayne United Gas Company to these plants amount to over 5,000,000 cubic feet daily.

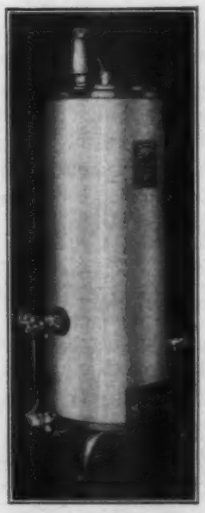
This new addition to the group of wells owned or controlled by Wayne United Gas Company is part of the company's scheduled program of development now progressing. Present estimated gas reserves of the company are 33,000,000,000 cubic feet, while gas rights are owned or controlled in approximately 43,000 acres in West Virginia, Ohio and Kentucky.

(News Continued on page 84)

Time proved value is of Key Importance in these days of Careful Buying



THESE are days of careful buying. Close scrutiny of value is the rule . . . And the name Welsbach, backed by 40 years of earned leadership in the gas appliance field, is recognized by Commercial Managers more fully than ever before as a definite factor in making sales... **Welsbach Radiant Heaters** are outstanding because of their original design and fine finish—yet are moderately priced . . . Welsbach quality is revealed in every detail of their construction.



Welsbach Water Heaters have gained their leadership through their efficient performance (and favorable prices). In fact there is not a single detail of any Welsbach appliance that will not bear close examination by today's buyers. When Welsbach gas appliances are featured, profitable sales are sure to result.

Member of American Gas Association

WELSBACH COMPANY

GLOUCESTER CITY, N. J.

Offices in Principal Cities

Associated Gas & Electric's Accountants Hold Conference

The accountant is the eye through which management and capital look at business, H. C. Hopson, vice president and treasurer of the Associated Gas & Electric Company told the Accounting Officers Association of the Associated System in conference at Rochester, N. Y. Mr. Hopson's talk was the high point of a three day conference of the system's accountants which was concluded on Wednesday August 27 with the election of H. C. Moore, of Ithaca, as chairman of the association.

In his address Mr. Hopson pointed to Associated's increase of 2 per cent in output as proof that much of the current business depression is psychological. He urged utilities to promote all the work they could to give jobs at once to those in need and thus ease the stress of unemployment.

The rise of the accountant from his old position, as "pencil pusher" to his present day standing as an economist was detailed by speakers during the sessions. Herman Russell, president of the Rochester Gas & Electric Corporation greeted the 125 delegates to the conference.

Among the other prominent speakers was H. M. Brundage, vice president of the Consolidated Gas Company of New York, who told of steps being taken by the utilities and public service commissions to arrive on common ground as to what is depreciation and the rate to be charged.

Home Service Course at Columbia University

Thirty-eight men and women completed on July 25, the three weeks course in gas equipment given by Dr. C. J. Lynde, head of the Household Engineering Department at Columbia University in cooperation with the American Gas Association and assisted in the laboratory course by T. H. Schleuning of the Consolidated Gas Company of New York.

For the benefit of 18 of the women who were particularly interested in Home Service work the Home Service Committee of the American Gas Association sponsored six afternoons of the course, three of which were lectures given by college instructors—a lecture on table service by Mrs. Lillian M. Gunn and two lectures by Dr. Victoria Carllson on Recent Research in Foods.

Three afternoons were spent with three Home Service Departments—one at Public Service Company of New Jersey in Newark, at which Ada Bessie Swann, the director, outlined the "Business of Home Service" in its organization, its relation to the executives, its relation to other departments and inter-relation of directors to a central office. The afternoon also included a typical demonstration.

Another afternoon was spent at the Consolidated Gas Company of New York, Jane Wagner, the director, outlined the activities of their home service department. A skit picturing a typical home call was enjoyed by the group as well as a demonstration on refrigerator desserts.

The third afternoon was spent at the Jamaica branch office of the Brooklyn Union Gas Company. Henry Behrman, Test Engineer, discussed "Safety of Gas Appliances" and among other things discussed flues. Ruth Soule, Home Service Director, discussed "Increasing the Percent of Contacts"—telling of the many outside contacts that can be made by a gas company through its home service department.

N. Y. Power & Light Introduce New Industrial Gas Rate

The new gas rate for industrial use, recently made effective in Albany, N. Y., by the New York Power and Light Corporation, is one of the lowest for manufactured gas prevailing anywhere in the country, according to a statement by J. L. Haley, Vice President of the Company. The introduction of this rate is another step in the Niagara Hudson Power Corporation's program for industrial development in the territory served, with the double object of building up industries here at present and attracting new manufacturing plants.

The new schedule, he said, is available to industrial and commercial customers in all cities supplied with gas manufactured at the coke oven plant in Troy and transmitted through the high pressure pipe lines. The communities now enjoying this rate are Troy, Albany, Rensselaer, Waterford, Cohoes, Watervliet, Schenectady, Ballston Spa., and Saratoga. The new rate will also prevail in Amsterdam. In these communities the new rate effects an immediate saving of about $53,500 to industrial and commercial customers, based on their present consumptions. The reduction in the cost of gas to large users, the Company feels, will greatly stimulate the use of gas as a fuel and as the consumption increases the savings will be very much greater.

The rate is advantageous only to customers using over 50,000 cubic feet of gas per month. Industrial customers who would not benefit by the application of the new schedule, due to low load factor or other operating conditions, may continue on the old rate they are now using.

The rate is new in structure and so far as is known there is no other like it in the country. It is made up of a reservation charge and a commodity charge. The reservation charge, which corresponds to the demand charge in the older type of rate, is considered as one-thirtieth of the highest use during any of the previous 12 months. The first 5000 cubic feet of this amount is billed at $1.25 per 1,000 cubic feet, next 20,000 cubic feet at 75c per 1,000 cubic feet and the balance at 30c per 1,000 cubic feet. The commodity charge is 55c per 1000 cubic feet for the first 300,000 cubic feet and 40c per 1000 cubic feet for all over that amount.

Missouri-Kansas Drilling Wells in Southwestern Kansas

Missouri-Kansas Pipe Line Company through its subsidiary companies, the Texas Interstate Pipe Line Company and the Missouri-Kansas Gas Company, is drilling eight wells in Stevens and Morton Counties in the Hugoton field located in Southwestern Kansas. This development is a joint operation with the Stevens County Oil & Gas Company and the Southwestern Kansas Oil & Gas Company. The gas from this area will be available for the Missouri-Kansas Pipe Line Company's main line system which is being extended eastward to Missouri, Illinois and Indiana points. A recently completed well of the company in Morton County, Kansas, has an open flow of 8,000,000 cubic feet. In addition to the Kansas development program the company is conducting six operations in the Texas Panhandle where seven wells have already been completed, having a combined open flow volume of 180,000,000 cubic feet.

Permission Granted to Transfer Lease

Permission has been granted to Frank J. Stoltz to transfer the lease of the natural gas plant of the Newfield Gas & Oil Company to the New York Central Electric Corporation and transfer all franchises granted by the town of West Sparta and Northern Dansville, Livingston County, N. Y., to the same corporation. The order of the Commission does not pass upon the value of the property to be leased or the price to be paid for it, but the order authorizes the New York State Electric Corporation to construct plants in the two towns and exercise franchises granted to the petitioner.

Colorado Springs to Get Natural Gas

Arthur C. Lee of Dodge City, Kansas, has signed a contract with the city of Colorado Springs to deliver natural gas from the fields in Stevens and Norton counties Kansas. Mr. Lee was given a twenty year franchise.

The pipe line will cost more than $2,000,000 and Mr. Lee has already deposited his check of "Good Faith" with the city and agreed that the measurements of gas delivered will be done under conditions prevailing in the producing field.

Change of Officials

Thomas R. Weymouth, retired as president of the Oklahoma Natural Gas Corporation to become chairman of its board of directors. E. C. Deal will take over the office of president.

Every Medium-Sized Home Can Afford this Barber Conversion Gas Heater

List Price
$112.50
No. 324-B Barber Automatic Burner

THIS new line of BARBER Automatic Conversion Gas Burners, with list prices from $72.50 up, creates an unusual opportunity for gas companies to convert the great middle class market to the use of gas for home heating. The "load" building possibilities are immense.

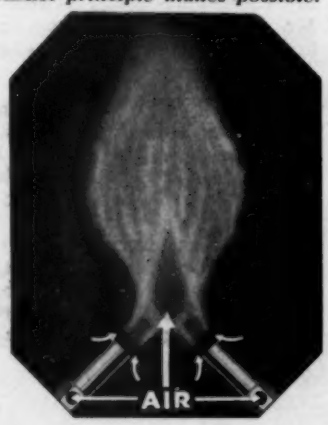
These people are eager to get away from the slavery of shoveling coal and hauling ashes. They have been waiting for an automatic conversion burner that would assure them an efficiency and economy favorably comparable with the custom-made gas-fired heating plant.

BARBER Automatic Gas Burners are the answer. With the BARBER Patented Jet Burner producing a flame hotter than ordinary mixer-type burners and with this flame applied directly to the heating surfaces of furnace or boiler, the result is an effectively heated home and moderate gas bills.

Now is the time to cash in on this opportunity. Write for our new sales book, "More Gas" which gives you the complete technical and selling story. Our new discounts are attractive.

BARBER Burners are quickly and easily installed in any furnace or boiler, in exactly the size and shape needed for efficient results.

Note in the illustration below how the proper amount of air is fed to the jets and flames especially through the vacuum formed where the twin-flames meet. This means perfect combustion which only the BARBER principle makes possible.



BARBER *Automatic* JET GAS BURNERS

THE BARBER GAS BURNER CO.

3702 SUPERIOR AVENUE CLEVELAND, OHIO

FORMERLY THE CLEVELAND GAS BURNER & APPLIANCE CO.

PERSONALS

L. C. Hoffman has recently been put in charge of all new business activities for the Chippewa Falls district of the Northern States Power Company of Wisconsin. Mr. Hoffman was transferred from Owen.

G. W. Leidholdt, formerly merchandise manager of the Interstate Power Company at Albert Lea, Minn., is now in charge of gas sales of the Northern States Power Company at Mankato, Minn.

Morris Tracy, who has served as auditor and assistant secretary of the Empire Gas and Electric Company at Geneva, N. Y., since 1918, was given charge of the Systems and Methods Department in the Comptroller's office of the Associated Gas and Electric Company at Ithaca, N. Y.

Mr. Tracy was Chairman of the Accounting Section, Empire State Gas and Electric Association last year and is a member of the Managing Committee, Accounting Section of the American Gas Association.

A. R. Tremaine, formerly general manager of the New York State Group of the Associated System, and located at Oneonta, N. Y., was recently made president of the New York State Electric and Gas Corporation. He is now located in the office of the J. G. White Management Corporation at 120 Wall Street, New York.

Elizabeth Lawton of the New Business Department of the Los Angeles Gas and Electric Corporation, recently won the first prize of $50 for her essay entered in the Pacific Coast Gas Association "Modernize with Gas" contest.

J. Lauritsen was recently appointed District engineer of the Public Service Company of Northern Illinois at Kankakee, Ill. Mr. Lauritsen succeeds O. M. Peaslee.

James A. Donovan was recently elected a director of the Lawrence Gas and Electric Company, Lawrence, Mass. Mr. Donovan is a member of the law firm of Coulson, Donovan and Hargedon, Lawrence.

S. R. Dull, well-known Atlanta cooking and home economics expert, has been appointed as advisory counsel for the home service department of the Atlanta Gas Light Company, it has been announced by J. W. Gates, general manager.

As a cooking expert, demonstrator and writer on home economics subjects, Mrs. Dull is one of the foremost authorities in the country, and her cook books and recipes have attained almost a world-wide distribution. Her connection with the Atlanta Gas Light company began with a four-day cooking school, conducted by her in the auditorium in the gas company's building. There will be at least two demonstrations a month conducted by Mrs. Dull for the gas company.

C. H. Stevick, who has been connected with the Consolidated Gas Company of New York and its affiliated gas companies for the past twenty-five years, has been appointed assistant to Mr. John Stilwell, vice-president in charge of industrial relations, according to an announcement made recently.

C. H. Stevick

Mr. Stevick was born in Newburg, Pa., and received his early education in the public schools of Harrisburg. In 1899 he entered the mechanical engineering department of Cornell University, and later went to Lehigh University to complete his studies.

He joined The United Gas Improvement Co., of Philadelphia, Pa., as a cadet engineer in 1903, and a year later went to Denver, Colo., to engage in special work for Henry L. Doherty & Co. In 1905 he returned East to enter the construction department of the New Amsterdam Gas Co., one of the affiliated companies of the Consolidated Gas Company of New York. He was later transferred to the operating department, and in 1914 was made superintendent of the company's Ravenswood plant.

For the past few months Mr. Stevick has been engaged in special work on meters and other assigned duties.

Victor Starzenski has been appointed Manager of Gas Sales, of the New York Power & Light Co. In his new position Mr. Starzenski will supervise the promotion of gas sales for industrial and domestic purposes throughout the New York Power territory. His office will be located at Albany.

Mr. Starzenski has been Gas Engineer of the company in charge of the large construction program now in progress, which is to provide increased manufacturing, transmission and storage facilities throughout the eastern part of the State. His successor as Gas Engineer has not been named.

Mr. Starzenski has been associated with the New York Power and Light Corporation for over twenty years, starting at Schenectady in July, 1908 as cadet engineer, following his graduation from Stevens Institute of Technology in that year. In 1912 he was made gas superintendent for the Schenectady Company and later in 1916 assistant general manager of both the Mohawk Gas Company and the Schenectady Illuminating Company. Upon the organization of the Adirondack Power and Light Corporation in 1920, he became general superintendent of the gas department, serving Schenectady, Glens Falls and Oneida. The following year he was appointed resident manager of the company's Schenectady District, continuing in that position until 1927, when he became manager of the Schenectady Division, including Ballston and Saratoga, on the organization of the New York Power and Light Corporation.

A. Graham Williams, Jr., general manager of the Fort Smith, Arkansas, Gas company and other Insull properties in the Fort Smith territory, has resigned his position with the company, and will devote his time to his private enterprises.

He will be succeeded by Dunham Scott, assistant general manager, who has been with the company since 1927, and in gas field development in the local territory for a number of years.

Mr. Williams has been in the gas business in the Fort Smith territory since 1919, when he started with the Twin City Pipe Line company and the Industrial Oil and Gas company, then engaged in developing the Kibler field.

Mr. Scott is an experienced gas operator, having been connected with S. H. Hale, gas field developer, and the Crow Oil and Gas company, which operated in the Kibler field for many years. When Hale's interests were acquired in 1927 by the United Public Service company, Mr. Scott joined the executive staff of the company.

Glen L. Strang, formerly new business representative of the Gas Service Company at Aurora, has accepted a position as sales manager with the Indiana-Kentucky Gas Corporation, with headquarters at Franklin, Ky.

Cecil P. Dodson has been appointed sales manager of the Illinois Power & Light Company at Jacksonville, Ill. He was transferred from Danville.

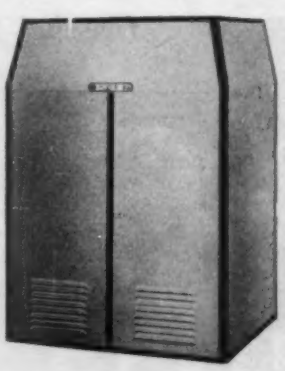
(*News continued on page 88*)

"The ROPER *has more outstanding features than any other gas furnace you can buy"*

Men in the industry say that a list of Roper features looks like a list of specifications for *the perfect gas furnace.*

That's why the Roper is becoming the most featured gas furnace in the field. It provides the new-day beauty, convenience and economy of operation that careful buyers demand!

The Roper gas furnace is constructed in units on the battery plan to fulfill every need of the smallest to the largest home. It can be furnished with or without thermostatic control, automatic humidifier, safety pilot, limit control, etc.; in fact, every modern device for air conditioning, safety and comfort of the owner. It is of heavy cast-iron construction and is A.G.A. approved.



Let us send you the facts about the Roper Gas Furnace. Compare its features, point for point, with those of any gas furnace on the market today. You'll stand ready to recommend it to your prospects with fullest confidence.

Geo. D. Roper Corporation, Rockford, Ill.

ROPER
GAS FURNACES

N. Henry Gellert was elected President of the Atlantic Gas Company, after the acquisition of the stock of that company by Albert E. Peirce and Company of Chicago, Illinois. Mr. Gellert succeeds Francis M. Brooke, who resigned.

Mr. Gellert has served as Vice President and General Manager since the start of the Atlantic Gas Company. His headquarters as well as that of the company will remain in Philadelphia.

In 1910 Mr. Gellert started in the Gas Industry with the American Gas Company, and has devoted most of his time to that business since. He was for a period of several years interested in the gas problems of the iron and steel industry. In this connection he served in a consulting capacity for the American Rolling Mill Company, the Colorado Fuel and Iron Company and others.

He has built several gas plants, managed many properties, and made many reports on existing properties.

For some years he was Consulting Engineer for Brooke, Stokes and Company, Bankers.

Mr. Gellert is a member of the American Gas Association, American Society of Mechanical Engineers, Associate Member of the American Society of Civil Engineers.

T. H. Tutwiler, president of Memphis, Tenn., Power & Light Company since 1923, and president of The Memphis Street Railway Company since 1906, resigned his office at a meeting of the Board of Directors recently.

W. D. Kyser, attorney, was unanimously elected to fill the vacanacy created by Mr. Tutwiler's resignation.

The changes became effective immediately following the action of the Board in accepting Mr. Tutwiler's resignation, and electing Mr. Kyser.

Upon acceptance of his resignation, the Board elected Mr. Tutwiler President Emeritus of the companies. In that capacity he will continue an advisory relationship, though free from arduous tasks. In tendering his resignation Mr. Tutwiler announced his intention to retire from active connection with the companies which he had served so long.

Mr. Kyser, successor to Mr. Tutwiler has been an unusually successful attorney, being associated with the law firm of Wilson, Kyser, Armstrong and Allen.

Luther Younce, for some time the superintendent of the Newcastle, Ind., gas plant of the Interstate Public Service Company, has been transferred to the office of superintendent of the Liberty (Ind.) Light and Power Company, recently taken over by the Insull interests. Younce formerly was superintendent of the Newcastle Water and Light Plant, a municipal utility and left it to become connected with the gas plant. He is succeeded by R. V. McGuire, who has been his assistant for some time.

Frank L. Hallock, who has been Assistant Treasurer of the Bronx Gas and Electric Co., New York, N. Y., has been promoted to Assistant to Col. O. H. Fogg, Vice-President in charge of Commercial Relations of the Consolidated Gas Company of New York.

Part of Mr. Hallock's new duties are concerned with putting into effect a program of education for contact employees

Frank L. Hallock

in the Commercial, Sales, and Customers' Service Departments.

Mr. Hallock entered the public utility business in 1910, as a bookkeeper for the Northern Westchester Lighting Co., at Peekskill, N. Y. He later advanced to the position of chief clerk, and in 1921 entered the employ of the Bronx Gas and Electric Co., as Superintendent of the Commercial Department. At that time the company served only about 14,000 gas and electric meters, while at the present time the number is about 100,000.

In July, 1927, Mr. Hallock was appointed Assistant Secretary of the company, and in February, 1928, Assistant Treasurer, retaining his duties as Superintendent of the Commercial Department.

Mr. Hallock's friends in the Bronx Gas and Electric Co. recently tendered him a farewell dinner in honor of his promotion, and presented him with a set of matched irons and a golf bag.

Earl Pickford has succeeded Robert Gilman as Sales Manager of the Twin State Gas & Electric Company, Brattleboro, Vt.

R. S. Diggs, formerly connected with Landers, Frary and Clark, is now with the Memphis Power & Light Company, Memphis, Tenn., as assistant sales manager.

Obituary

N. D. VAN BLARCOM

N. D. Van Blarcom, Assistant to the Vice-president in charge of Industrial Relations, and Personnel Director of the Consolidated Gas Company of New York, died at his home in Passaic, New Jersey, on August 6, following an illness of several months.

Mr. Van Blarcom was connected with the Consolidated Gas Company for a period of twenty years, having joined the company in 1910 as a stenographer in the construction department. Prior to that time, he was engaged in newspaper work, and in accounting and engineering activities for the Erie Railroad Company. He also spent some time in the statistical department of the Lackawanna Railroad Company, and then became associated with a public accountant engaged in municipal auditing.

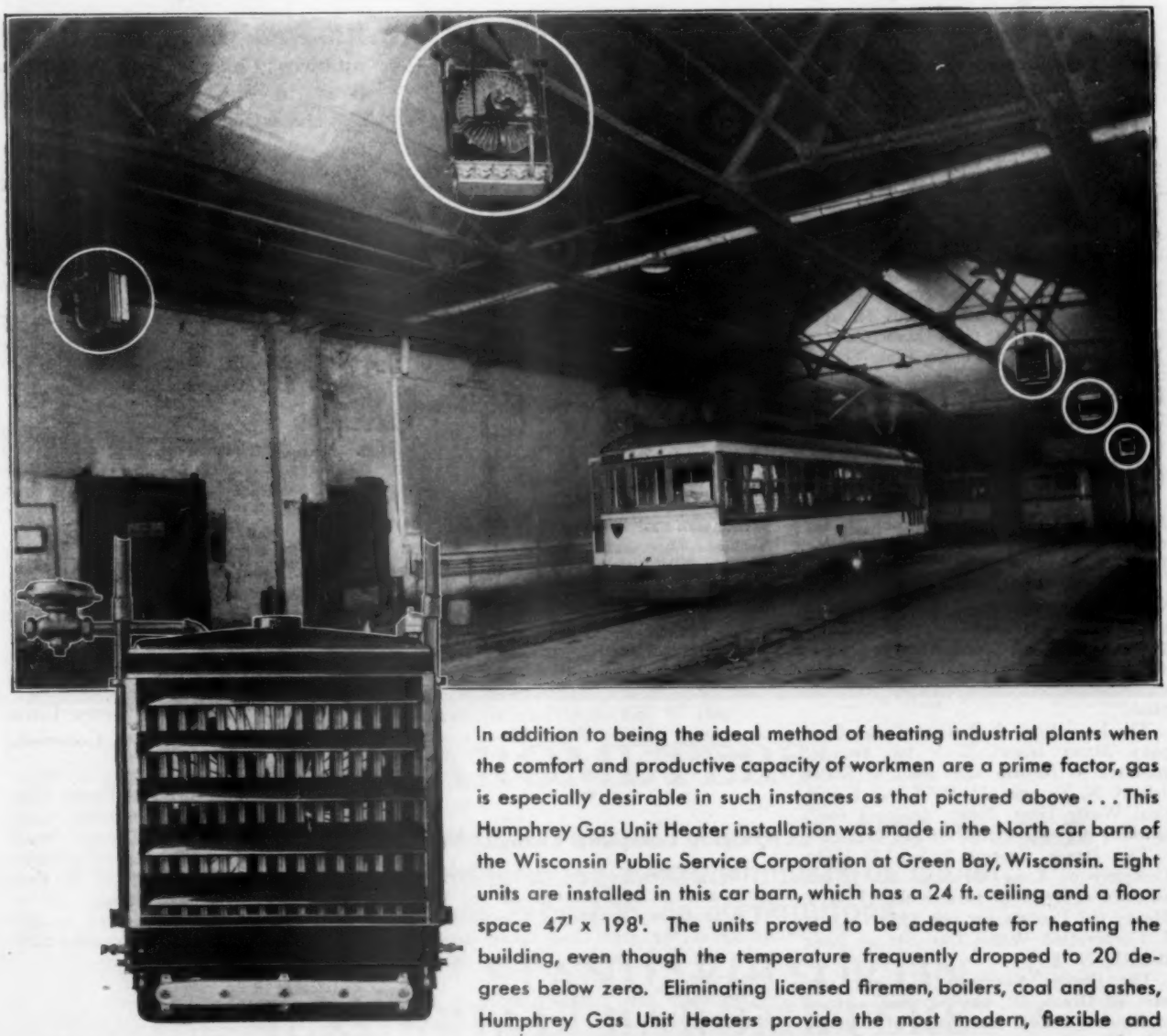
In 1916 Mr. Van Blarcom was elected secretary of the Gas Companies' Employees' Mutual Aid Society. Subsequently the growth of the Society's activities required him to relinquish his duties as chief clerk of the construction department to devote all of his time to the society's interests.

He was appointed Personnel Director on June 1, 1928, and Assistant to the Vice-president in charge of Industrial Relations on November 1, 1929.

Mr. Van Blarcom was Assistant Secretary in charge of home operations for the Green Mountain Lake Farms, Inc., the convalescent resort maintained by the Consolidated Gas Co. and affiliated companies. He was Secretary of the Advisory Committee of the Farm, the Gas Company representative on the Board of the New York Edison Savings and Loan Association and a member of its membership committee. He was also a member of the Educational Committee of the Association of Employees of the New York Edison Company, and Secretary and a Director of the Incorporated Association of Gas Employees.

He was active in the affairs of the American Gas Association, serving as a member of the Committee on the Education of Gas Company Employees, and as a Chairman of the Sub-Committee on the Home Study Course on Manufactured Gas. He was also a member of the Sub-Committee on Educational Booklets, and the Joint Committee on the proposed Home Study Course in Accounting.

. . . Humphrey Gas Unit Heaters Provide Unequaled Advantages In Industrial Heating



In addition to being the ideal method of heating industrial plants when the comfort and productive capacity of workmen are a prime factor, gas is especially desirable in such instances as that pictured above . . . This Humphrey Gas Unit Heater installation was made in the North car barn of the Wisconsin Public Service Corporation at Green Bay, Wisconsin. Eight units are installed in this car barn, which has a 24 ft. ceiling and a floor space 47' x 198'. The units proved to be adequate for heating the building, even though the temperature frequently dropped to 20 degrees below zero. Eliminating licensed firemen, boilers, coal and ashes, Humphrey Gas Unit Heaters provide the most modern, flexible and adaptable form of efficient heating for every type of industry.

GENERAL GAS LIGHT COMPANY, KALAMAZOO, MICHIGAN, New York - Pittsburgh - Cleveland - San Francisco

The Humphrey Gas UNIT HEATER

TRADE NEWS

United Engineers & Constructors, Inc.—Activities

The Mobile Gas Company, of Mobile, Alabama, has awarded contract to furnish material and labor and equipment necessary to install 17,000 ft. of 16" Dresser coupled main and 8,000 ft. of 10" welded steel main in and about the city of Mobile.

The Hartford Gas Company of Hartford, Conn., has awarded contract to furnish, deliver and install 11,008 ft. of 6" welded steel main from Manchester to Manchester, Vernon Town Line, Conn.

The Rockville—Willimantic Lighting Company, of Norwich, Conn., has awarded contract to furnish, deliver and install 25,412 ft. of 6" welded steel main from Manchester-Vernon Town line to the Gas Plant at Rockville, Conn.

The Peoples Power Company, of Moline, Ill., has awarded contract to furnish one (1) Cooler, with inlet and outlet connections.

The South Carolina Public Service Company of Charleston, S. C., has awarded contract to furnish for that Company two (2) Cyclonic Dust Arresters. Two (2) Model "B" Automatic Control Machines will also be furnished for this plant.

The New York & Richmond Gas Company, Staten Island, N. Y. has awarded contract to furnish and intall at Staten Island, N. Y., one (1) 6'9" U. G. I. Vertical Waste Heat Boiler, designed for a working pressure of 160 lbs. per sq. inch.

The Jersey Central Power & Light Company of Long Branch, N. J. has awarded contract to furnish the U. G. I. Heavy Oil Process for one (1) 11' U. G. I. Carburetted Water Gas Set at Long Branch, N. J.

The Illinois Northern Utilities Company of Dixon, Ill., has awarded contract to furnish, deliver and install at their De kalb, Ill. Plant, 1 6' cone top carburetted water gas apparatus, complete to valve on outlet of washer tar batter, necessary operating floor, blat main, etc.

Republic Steel Corp.'s New Plant Devoted to Making Electric Weld Pipe

A new kind of welded pipe, generally regarded as the equal of seamless pipe, has been made available to pipe users with the placing in operation of Republic Steel Corporation's new plant devoted to the making of electric weld pipe.

An experimental mill making only small sizes has been in production for almost a year with the result that over 2,000 miles of pipe were placed in service. The many advantages of this pipe were so apparent that the demand created made necessary the building of a completely equipped new plant for making sizes from 4½ to 16 inches in diameter.

Some of the advantages claimed for Republic electric weld pipe are: Guaranteed 100 per cent efficiency of weld, uniform wall thickness, perfect roundness, uniform strength and resistance to corrosion, freedom from flat spots, scale and oxide free, and smooth finish.

New Ruud Manual for Home Service Directors

The Home Service Department of the Ruud Manufacturing Company, Pittsburgh, Pa., has recently issued a comprehensive and helpful manual for Home Service Directors and others making home calls, entitled "Hot Water in Home Call Contacts". This booklet contains many suggestions and includes an interesting outline of water heater construction, facts concerning furnace coils, controlled water temperature, high gas bill complaints, etc.

Copies of this paper may be obtained on request to the Ruud Manufacturing Company.

Quigley Company Changes Name

The Quigley Furnace Specialties Company announces a change in the name of the company to Quigley Company, Inc., owing to the rapid and broad development of their products during the last few years.

Originally this company dealt in furness specialties only, but in recent years has engaged in the manufacture and marketing of a number of additional products used in a wide variety of industries, so that "Industrial Specialties" more aptly describes the nature of the business.

While the Quigley Company will continue to manufacture Hytempite on a bigger scale than ever, they have added other products, several of which are not related to furnace operation.

Their products now include: Hytempite, high temperature cement; Q-Chrome, a neutral base refractory cement; Acid Proof Cement, for acid resisting masonry; Ganisand, granular refractory; Quigley Gun, for shooting refractory and concrete mixtures; Triple-A Protective Coatings for metal, concrete, stucco, wood, etc.; Q-Seal, a plastic, expansive, joint-sealing compound and Annite, an all purpose cleaning compound. The main office of Quigley Company is at 56 West 45th Street, New York City, with distributors in ninety cities throughout the United States and at thirty-five foreign points.

Roberts & Mander Stove Co. Announces Change in Representatives in New York City, New Jersey and New England

Due to the untimely death of Mr. Harry P. Dains who died from an accident at his summer home in Medford Lakes, N. J. on June 30th it was necessary for the Roberts & Mander Stove Company to revise their Sales Representative's territories so that the customers will receive the same service as in the past.

As of August 4th, Mr. Jesse R. Stetser made his headquarters at the Martinique Hotel in New York City in order to better serve the Metropolitan District of New York.

At the same time Mr. Leslie Newman who has represented the company in New England, made his headquarters at Newark, to take up the work where Mr. Stetser relinquished it in New Jersey.

Mr. Herbert Collier who is well acquainted with the Gas Industry in New England, made his headquarters in Boston, Mass. and will continue with the work handled by Mr. Newman through the New England warehouse.

New Office of Bailey Meter Company Located at Denver, Colorado

The Bailey Meter Company of Cleveland, Ohio, manufacturers of Power Plant Metering Equipment, Automatic Combustion Control and Feed Water Regulators, announces the opening of a branch office in Denver, Colo. Mr. M. E. Reddick has been appointed Manager of this Branch Office, which is located at 2370 Dahlia Avenue; telephone Franklin 2292

Erratum

On page 61, bottom of third column, of the August, 1930, issue of the American Gas Journal reference was made to the fact that a mat book was being distributed by the Humphrey Company, Kalamazoo, Mich., on radiant gas heaters. This should be corrected to read Humphrey Gas Water Heaters.

In conjunction with the various mats, window trims and the like, which are being furnished by the Humphrey Company, plans have been worked out to the end that the dealers may be able to have a plan systematically put before them month by month in order to get the most out of water heater sales with increased yearly gas output by cooperating with the Humphrey Company in selling Humphrey Gas Water Heaters.

(*Trade News continued on page 92*)

SUPERIOR

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Service Cleaners
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Repairs

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PHILADELPHIA, THE WORKSHOP OF THE WORLD
has 14,000 Manufacturing Establishments of which many have World-Wide Reputations.

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are in World-Wide use because they, too, have a "World-Wide Reputation"

THEY ARE GOOD BAROMETERS
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For more than a decade they have been made in such manner that they can be shipped safely and successfully wherever there is a common carrier. This has been recognized as an achievement in Barometry.

PRECISION THERMOMETER & INSTRUMENT COMPANY
1439 BRANDYWINE STREET - - - - - PHILADELPHIA, PA.

S. F. Hayward Returns from Alaska

Mr. S. F. Hayward, of the Connelly Iron Sponge & Governor Company, well known in the gas industry for over half a century, has just returned with Mrs. Hayward from a six weeks trip to Alaska.

A New Way of Placing Physical Forces at the Elbow of the Engineer

When the engineers and scientists of the A. O. Smith Corporation of Milwaukee take over their quarters in the company's new Research and Engineering Building, now in course of construction, they will find virtually every form of mechanical energy at their command, for use in their experimental and development work.

In the Research and Engineering Building, a unique use has been made of a recently developed architectural feature—the hollow column type of construction. Hollow columns have been employed before in a few structures, but so far as is known, have been utilized only as supports for the building. In the A. O. Smith Building, however, the interior of the columns is used as a passageway to carry steam pipes, electric light wires, water pipes, telephone wiring, etc.

But in addition to these usual conveniences, the hollow columns also carry conveniences especially adapted to the use of the 1,000 engineers and scientists who will make up the A. O. Smith engineering force. Steam power pipes, high tension lines for electric welding, compressed air lines, fuel oil lines and even lines for supplying oxygen, are led through the columns in such a way that they are quickly available in all parts of the building.

The girders, as well as the columns, are of hollow construction. In fact, the entire structure is a veritable honeycomb of passageways and ducts. So extensive is the system that the transmission channels of the various kinds of energy can quickly be carried to within ten feet of any designated point within the entire building.

The passageways within the hollow columns and girders are amply large to accommodate the pipes, ducts and conduits, and also to permit the free passage of workmen throughout the system for inspection, repair, and the making of new connections.

The columns and girders are also used as ducts for a complete ventilating and air conditioning system. Even the sprinkler system is concealed—nothing but the heads being visible.

So far as is known, this use of the hollow column and girder type of construction is entirely original. It was developed by the engineering force of the A. O. Smith Corporation.

The Research and Engineering Building will be given over entirely to industrial research, experiment and development work. It will contain laboratories for mechanical and electrical research, experimental welding, forging development, and chemical experiment and research. The laboratories will, of course, be fully equipped with every type of machine and appliance that the engineers will need in carrying on their work.

Philfuels Plant for Chisholm, Minnesota

One of the most recent installations of the Philfuels Process of Gas Manufacture is at Chisholm, Minnesota, where the Northland Utilities Company has constructed a new plant and distribution system to furnish this community with gas service.

Butane Storage Tank

The Northland Utilities Company, A Minnesota corporation, was recently organized to contruct and operate butane gas plants and they have an extensive program of expansion throughout northern Minnesota. Construction of their second gas property at Eveleth, Minnesota, is already under way. The directors and executives of the Northland Utilities Company, are business men of Hibbing, Chisholm and Virginia, Minnesota.

Mr. H. L. Brownell of Hibbing, Minnesota, has been in charge of the engineering and construction of the Chisholm plant. Chisholm has a population of 8500 and is near the center of the Iron Range of Northern Minnesota, which produces a major portion of the iron ore used in the United States.

Use of Cast Iron Pipe in High Pressure Transmission Lines

Southern Natural Gas Corporation has found that cast iron pipe can be successfully used in high pressure transmission lines and has recently contracted for $110,000 worth of this material from Birmingham, Ala., manufacturers. Heretofore steel pipe has been largely used, since it was impossible to obtain a cast iron pipe joint that would not leak under pressure. A test made of a new type joint designed by a Birmingham manufacturer proved that it can be satisfactorily used.

Haynes Stellite Company Opens New Foundry

Haynes Stellite Company, Kokomo, Ind., a unit of Union Carbide and Carbon Corporation, has announced the completion of a new foundry at the Kokomo Works, which has been built expressly for the manufacture of the Hastelloys, a group of new acid resistant alloys. The most up-to-date and efficient foundry equipment procurable has been installed to insure careful control of quality and uniformity of product. The Hastelloys form a group of corrosion-resistant alloys with unique properties. They are of particular interest to chemical engineers, and others who have been faced with the problem of providing suitable equipment for resisting the action of hydrochloric acid and moist chlorine.

Information with regard to the Hastelloys may be obtained from the various offices of the Haynes Stellite Company or by writing to their General Offices in Kokomo, Ind.

New Catalogue on Dry Purification

A completely revised booklet on Dry Purification, featuring Lux-Material, has been brought up to the present year by the manufacturers, The Alpha-Lux Company, 192 Front St., New York. Copy of booklet will be mailed on request.

Units of the Union Carbide and Carbon Corporation to Exhibit at the National Metal Congress and Exposition

Several units of the Union Carbide and Carbon Corporation, 30 East 42nd Street, New York, will exhibit jointly at the twelfth annual National Metal Congress and Exposition which will be held at the Hotel Stevens, Chicago, September 22 to 26; The Linde Air Products Company, The Prest-O-Lite Company, Inc., Oxweld Acetylene Company, Haynes Stellite Company, The Oxweld Railroad Service Company, and Union Carbide Sales Company, will jointly occupy Booths 81 and 82 where the products of these subsidiaries will be prominently displayed.

A feature of the exhibit will be a guessing contest on tensile strength of oxy-acetylene welded test coupons which will be pulled on the Oxweld Portable Tensile Testing Machine.

The Union Carbide and Carbon Corporation booths will be in charge of Mr. E. J. Hayden of the Chicago Office and Mr. H. H. Griffith of the New York Office. Others in attendance will be Mr. H. F. Bulkley and Mr. T. C. Fetherston, of the New York Office, and Chicago sales representatives of the various units exhibiting.

120,914,000 STROKES AND NO PERCEPTIBLE WEAR

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Write today for the facts on "Automatic Painting."

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253 Broadway New York City

Western Branch
447 Sutter Street
SAN FRANCISCO

Cleveland Gas Meters have a reputation for dependable service, the result of over thirty years' experience in manufacturing.

Our thoroughly organized and completely equipped factory assure you that the workmanship, materials, accuracy and general efficiency are unequaled.

"A" Type Meters "B" Type Meters

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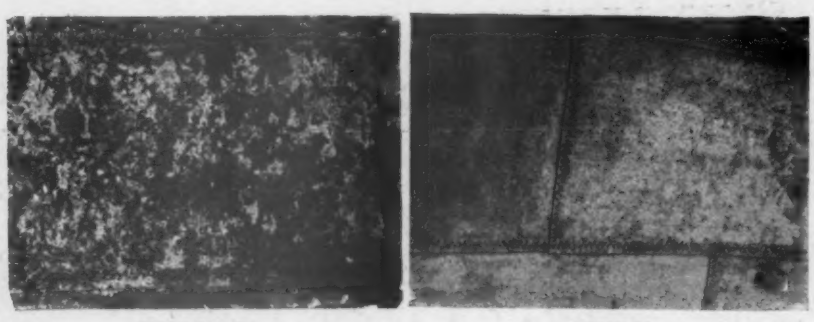

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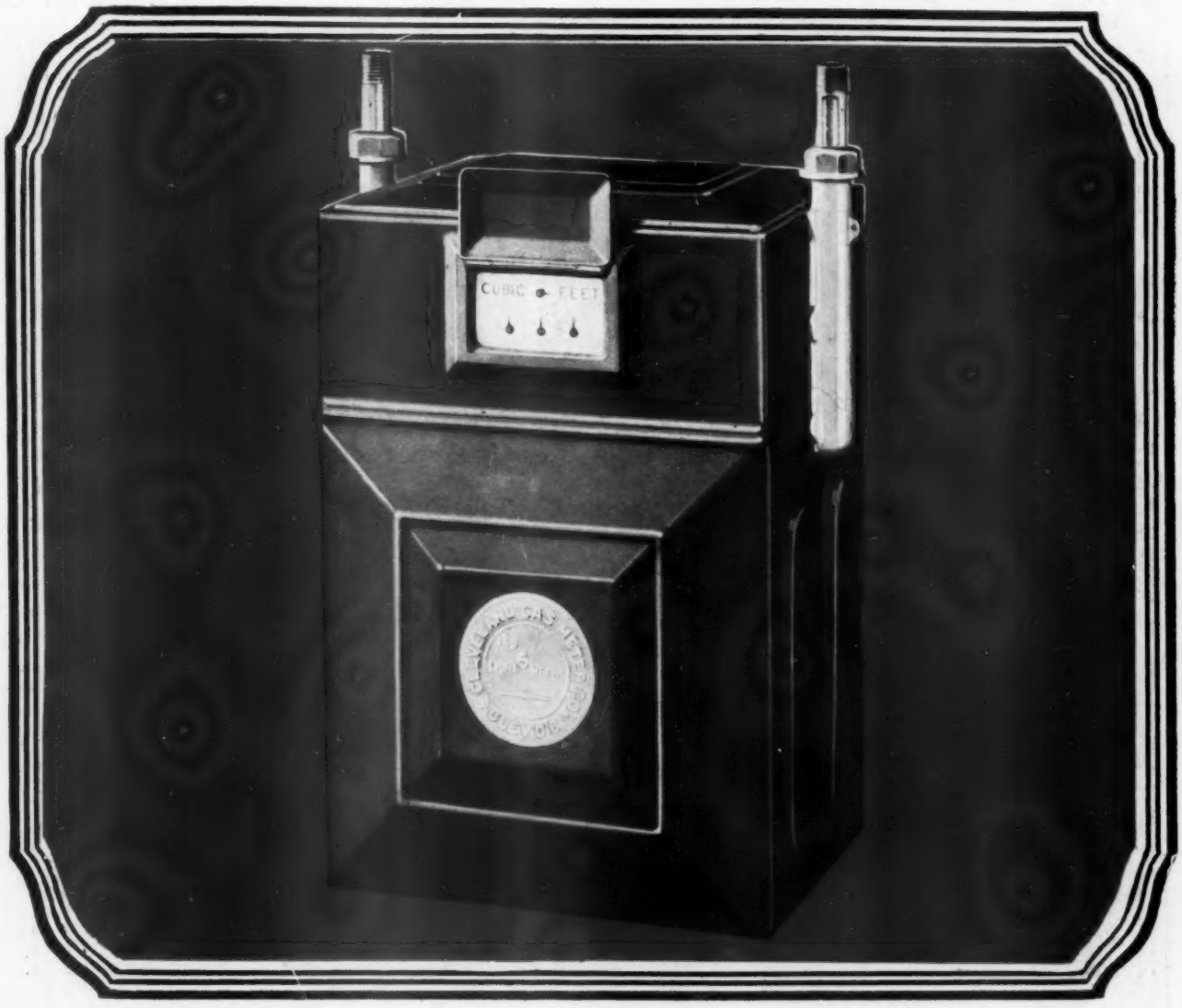

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Our thoroughly organized and completely equipped factory assure you that the workmanship, materials, accuracy and general efficiency are unequaled.

"A" Type Meters "B" Type Meters

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On Monday, August 18th, the first wheels revolved and the pneumatic hammers began their incessant roar, in our New Tank Shop.

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No cent has been spared to make this the finest and best equipped Copper Tank Shop in the country, and is just one step nearer the goal for which we have always striven, to make the finest water heater for the least money that human brains and engineering can produce.

THE KOMPAK COMPANY,
New Brunswick, N. J.

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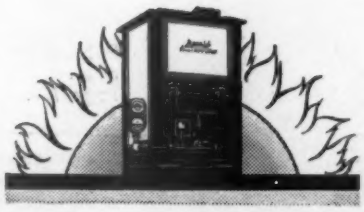

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How Many in Your Territory?

IF you are not going after this profitable market you are losing sales, profits and the increased load that can easily be yours.

Every home with automatic heat, many other *modern* homes that demand the best, hospitals, schools, institutions, undertakers, banks and industrials—all need and want the kind of service that only Kernit and Kleenburn can furnish them. This profitable market has the money to buy.

The Kernit line is complete—a model for every purpose and preference, with a price range that meets every purse.

Gas companies, from coast to coast, are demonstrating that Kernit and Kleenburn sales are made quickly, profitably and with less effort than on any other appliance in the same price range.

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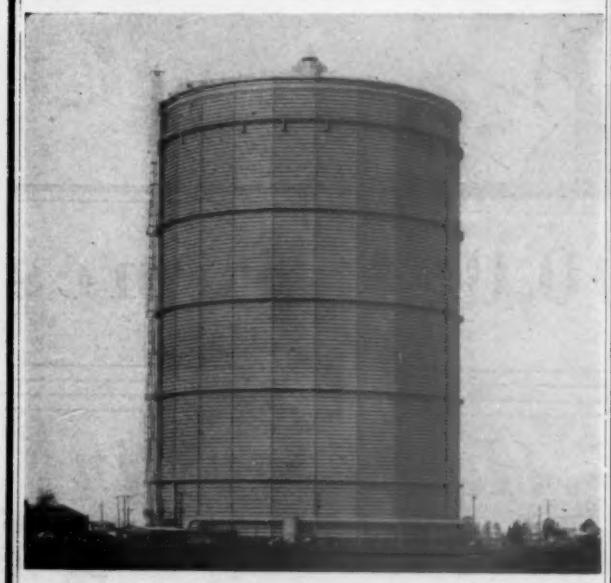

This 10,000,000 cubic foot waterless holder in the Middle West is one of hundreds protected and beautified by CE-CO Holder Paints.

CE-CO Gas Holder Paints make for Good Protection Good Economy Good-Will

The three outstanding features noted above have been incorporated in CE-CO Gas Holder Paints through a knowledge of *Technical* Paint making extending over half a century.

GOOD PROTECTION—By the combination of special elastic oils and waterproof binders CE-CO Gas Holder Paints will give the maximum of protection against corrosion, sulphur gases and fumes.

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GOOD WILL—The wide selection of attractive colors obtainable in CE-CO Gas Holder Paints, enable you to overcome the unsightliness of holders in residential districts and thus win the good-will of the neighbors.

The thousands of gallons of CE-CO Gas Holder Paints used every year is testimony to their durability and serviceability.

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The Western Gas Construction Co. 88

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Western Gas Construction Co. 451

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American Meter Co. 320

AUTOMATIC GOVERNORS
Connelly Iron Sponge & Governor Co. 289

BALANCE GOVERNORS
Connelly Iron Sponge & Governor Co. 290

BACK PRESSURE VALVES
Connelly Iron Sponge & Governor Co. 295

BECKER TYPE COMBUSTION COKE & GAS OVENS
The Koppers Construction Co. 235

B. H. CO. THICKENER
The Bartlett Hayward Co. 56

B. H. CO. VERTICAL SCRUBBER
The Bartlett Hayward Co. 57

BUTTERFLY VALVES
Western Gas Conctruction Co. 450

CALORIMETRY
American Meter Co. 321

CAMPBELL SOLID METAL WINDOW, THE
The Bartlett Hayward Co. 53

COAL AND ASHES GATES
C. W. Hunt Co., Inc. 233

COAL PRODUCTS TREE
The Koppers Construction Co. 234

COKE FIRED GAS PRODUCER OPERATION
The Koppers Construction Co. 236

CONTINUOUS VERTICAL COMBINATION OVENS
The Koppers Construction Company 238

COUNTER BALANCE MANHOLES
Connelly Iron Sponge & Governor Co. 299

DE FLOREZ REMOTE MANUAL CONTROL SYSTEM
Brown Instrument Co. 452

DEHYDRATION OF MANUFACTURED GAS
The Koppers Construction Co. 237

DISTRICT L. C. GOVERNORS
Connelly Iron Sponge & Governor Co. 293

DR. OTT-LUX-GAS TESTER
The Alpha Lux Co., Inc. 23

DUPLEX VALVES
Andale Co. 45

FAST'S FLEXIPLE COUPLING
The Bartlett Hayward Co. 54

FORGED STEEL GATE VALVES
Darling Valve & Mfg. Co 20

GAS CONDENSERS
Isbell Porter Co. 140

GAS COOLER
Andale Co. 46

GAS DISTRIBUTION
The U. G. I. Contracting Co. 76

GAS FILTERS
American Meter Co. 322

GAS MEASUREMENT
American Meter Co. 323

HAND COLORIMETER
The Alpha Lux Co. Inc. 22

HIGH EFFICIENCY GAS CONDENSERS
Isbell Porter Co. 137

HOWARD CHARGER
The Western Gas Construction Co. 87

INDUSTRIAL RAILWAY
C. W. Hunt Co., Inc. 230

HIGH TEST WELDING ROD
Union Carbide & Carbon Corpn. 255

JET PHOTOMETERS
Connelly Iron Sponge & Governor Co. 298

KENNEDY AUTOMATIC CONTROL
The Bartlett Hayward Co. 55

KOPPERS COMPANY'S COAL GAS PLANTS, THE
The Koppers Construction Co. 240

LABORATORY APPARATUS
American Meter Co. 324

LA MONT WASTE HEAT STEAM GENERATOR
The Bartlett Hayward Co. 52

LIQUID PURIFICATION
The Western Gas Construction Co. 85

LUX RECORDING GAUGE
The Alpha Lux Co., Inc. 21

MACKENZIE EXHAUSTERS
Isbell Porter Co. 141

MANUAL OF DRY BOX PURIFICATION
E. J. Lavino and Co. 276

MERCURY SEAL GOVERNORS
Connelly Iron Sponge & Governor Co. 291

METERS, GAS
American Meter Co. 326

"METRIC" IRONCASE METERS
American Meter Co. 325

MITCHELL ELECTRIC VIBRATING SCREENS
C. W. Hunt Co., Inc. 229

NAPHTHALENE ABSORPTION PLANTS
The Western Gas Construction Co. 84

NEW APPARATUS FOR THE REMOVAL OF NAPHTHALENE AND GUM FORMING CONSTITUENTS FROM GAS
The Koppers Construction Co. 242

NEW METHODS OF GAS PURIFICATION
The Koppers Construction Co. 241

OBSERVATIONS ON LUX-MATERIAL
The Alpha Lux Co., Inc. 24

ORIFICE METERS
American Meter Co. 327

PIPE—TONCAN IRON
Republic Steel Corp. 454

PIVOTED BUCKET CONVEYORS
C. W. Hunt Co., Inc. 232

PRESSURE GAUGES
Connelly Iron Sponge & Governor Co. 296
American Meter Co. 328

PURIFICATION OF OPEN HEARTH FUEL GAS, THE
The Koppers Construction Co. 239

RELIANCE SERVICE REGULATORS
Isbell Porter Co. 139

ROADLESS BARROWS
Isbell Porter Co. 133

ROTARY SELF-CLEANING STRAINER
Andale Co. 47

SERVICE CLEANERS
American Meter Co. 329

SERVICE GOVERNORS
Connelly Iron Sponge & Governor Co. 292

SERVICE D. C. GOVERNORS
Connelly Iron Sponge & Governor Co. 294

SHAVING SCRUBBERS
Isbell Porter Co. 138

SKIP HOISTS
C. W. Hunt Co., Inc. 231

SMOOT CONTROL OF COMBUSTION AS APPLIED TO TRAVELING GRATE STOKERS
Smoot Engineering Corpn. 69

SMOOT CONTROL AS APPLIED TO UNDERFEED STOKERS
Smoot Engineering Corpn. 67

SMOOT CONTROL AS APPLIED TO WATER GAS SETS
Smoot Engineering Corpn. 68

SMOOT STEAM ACCUMULATOR AND CONTROL SYSTEM
Smoot Engineering Corpn 66

(Continued on page 100)

DEPENDABLE · ECONOMICAL · · · ·

BECAUSE IT HAS THE FAMOUS SPENCER SNAP ACTING THERMOSTATIC DISC · ·

THE simplest of all safety pilots . . . that is the key point of Klixon Products because they have exclusive use of the famous Spencer thermostatic disc. This disc closes the main gas valve with a direct thrust if the pilot light is extinguished for any reason. There are no other moving parts. If you have never had one of these discs in your hands, we shall be glad to send you a sample, with directions as to its operation. Once you have seen it in action you will instantly realize why no other safety pilot can compare with the Klixon. The attached coupon will bring you this sample disc with a folder containing full information about the safety pilot. No obligation. Please give title showing position in your firm.

SPENCER THERMOSTAT CO

CAMBRIDGE · · · MASS

SPENCER THERMOSTAT CO., CAMBRIDGE, MASS.
PLEASE SEND SAMPLE SPENCER DISC TO:—

NAME ..... TITLE .....

FIRM .....

ADDRESS .....

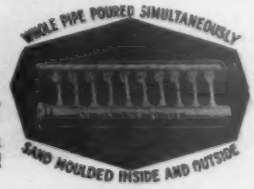
TRULY NATIONAL

National acceptance and approval of McWane Cast Iron Gas Pipe call for nation-wide service. Two foundries serve the country well. Above is shown a truck-load of McWane Pipe, with trailer, on the way to the trench one week after order was placed.

"The best of the old, plus the best of the new"—shipped promptly.

SAND CAST

McWANE Pipe is SAND CAST — yet modern in weights and strengths.



SIZE RANGE

1¼ thru 12 inches. Standard lengths. Flexpan, threaded, or B & S Joints.

McWANE 1¼ and 2 inch cast iron pipe gives you a permanent pipe in the small diameters, too. Avoid rust with it, at low cost. No coating or coddling needed.

WRITE FOR ILLUSTRATED LITERATURE

McWANE CAST IRON PIPE

McWANE CAST IRON PIPE COMPANY BIRMINGHAM, ALA.

PACIFIC STATES CAST IRON PIPE COMPANY PROVO, UTAH.

SALES OFFICES, PRINCIPAL CITIES

TRADE CATALOGS

(Continued from page 98)

SPECIFICATIONS ON HIGH AND LOW PRESSURE HOLDERS
The Stacey Bros. Gas Constrn. Co. 74

"STACEY BULLET"
The Stacey Bros. Gas Constrn. Co. 73

STREET DEPARTMENT TOOLS
Connelly Iron Sponge & Governor Co. 297

STREET MAIN GOVERNORS
Isbell Porter Co. 134

THROTTLE GOVERNORS & COMPENSATORS
Isbell Porter Co. 142

U. G. I. BARRING DOWN MACHINE, THE
The U. G. I. Contracting Co. 77

U. G. I. INTERMITTENT CHAMBER OVENS
The U. G. I. Contracting Co. 75

U. G. I. MECHANICAL GENERATOR AND CHARGER, THE
The U. G. I. Contracting Co. 79

U. G. I. MODEL "B" AUTOMATIC CONTROL, THE
The U. G. I. Contracting Co. 78

VALVES
The Western Gas Construction Co. 86

VALVES & SPECIALS
Isbell Porter Co. 144

VALVES
Darling Valve & Mfg. Co. 35

WATER GAS
The Western Gas Construction Co. 89

WATERLESS GAS HOLDERS
The Bartlett Haynard Co. 58

WEST GAS
West Gas Improvement Co. 175

POSITIVE PRESSURE BLOWERS
The Connersville Blower Co. 61

ROOTS ACME GAS PUMPS
The P. H. & F. M. Roots Co. 212

ROOTS ACME GAS PUMP INSTRUCTIONS AND PARTS LIST
The P. H. & F. M. Roots Co. 211

ROOTS GAS PUMP INSTRUCTIONS AND PARTS LISTS
The P. H. & F. M. Roots Co. 213

ROOTS POSITIVE DISPLACEMENT METER
The P. H. & F. M. Roots Co. 209

ROTARY DISPLACEMENT METERS
The Connersville Blower Co. 59

ROOTS ROLLER BEARING GAS PUMPS
P. H. & F. M. Roots Mfg. Co. 423

ROOTS ROLLER BEARING BLOWERS, STANDARD DUTY, HEAVY DUTY
P. H. & F. M. Roots Co. 453

STANDARD DUTY GAS PUMP CONSTRUCTION
The P. H. & F. M. Roots Co. 216

STANDARD HOLDERS FOR LOW PRESSURE STORAGE
Stacey Mfg. Co. 424

HIGH PRESSURE GAS HOLDERS
Stacey Mfg. Co. 425

LUDLOW VALVES AND HYDRANTS
The Ludlow Valve Mfg. Co. 426

INSTRUMENTS

BRISTOL'S AIR OPERATED CONTROLLERS
The Bristol Co. 122

BRISTOL'S AUTOMATIC ELECTRIC CONTROL VALVES
The Bristol Co. 126

BROWN AUTOMATIC TEMPERATURE CONTROL CATALOG
The Brown Instrument Co. 166

BROWN ELECTRIC FLOW METER CATALOG
The Brown Instrument Co. 170

BROWN REMOTE TYPE INSTRUMENTS
Brown Instrument Co. 427

BRISTOL'S LONG DISTANCE TRANSMITTING GAUGES
The Bristol Co. 129

BRISTOL'S PYROMETERS
The Bristol Co. 130

BROWN PYROMETER CATALOG
The Brown Instrument Co. 171

BRISTOLS PYROMETER CONTROLLERS
The Bristol Co. 123

BRISTOLS RECORDING BAROMETERS
The Bristol Co. 125

BRISTOL'S RECORDING LIQUID LEVEL GAUGES
The Bristol Co. 128

BRISTOL'S RECORDING MILLIVOLTMETERS FOR ELECTROLYSIS SURVEYS
The Bristol Co. 127

BRISTOL'S RECORDING PRESSURE & VACUUM GAUGES
The Bristol Co. 132

BRISTOL RECORDING PSYCHROMETERS
The Bristol Co. 308

BRISTOL'S TEMPERATURE CONTROLLERS
The Bristol Co. 124

BRISTOL'S RECORDING THERMOMETERS
The Bristol Company 134

HOW THE OTHER FELLOW DOES IT—(FEATURING TEMPERATURE CONTROL IN 22 GAS FIRED INDUSTRIAL HEATING JOBS)
The Brown Instrument Co. 165

MEETING YOUR IDEAS ON THE FLOW PROBLEM
The Brown Instrument Co. 164

PRESSURE GAUGE CATALOG
The Brown Instrument Co. 169

RECORDING DEMAND FOR GAS METERS
American Meter Co. 330

RECORDING THERMOMETERS CATALOG
The Brown Instrument Co. 168

RESISTANCE THERMOMETERS CATALOG
The Brown Instrument Co. 167

REGULATORS

AUTOMATIC TRUCK-CLOSING ANTI-VACUUM VALVE
Reynolds Gas Regulator Co. 282

BOTTLED GAS AN ALLY OF THE GAS INDUSTRY
Sprague Meter Co. 306

FULTON GAS FUEL BOILER GOVERNOR
The Chaplin Fulton Mfg. Co. 248

FULTON GAS REGULATOR CATALOGUE
The Chaplin Fulton Mfg. Co. 247

HIGH PRESSURE LINE REGULATORS AND HIGH PRESSURE RELIEF VALVES
Reynolds Gas Regulator Co. 278

HIGH PRESSURE SERVICE REGULATORS
Reynolds Gas Regulator Co. 279

LITTLE GIANT HOUSE REGULATOR
Reynolds Gas Regulator Co. 283

LOW PRESSURE SERVICE REGULATORS
Reynolds Gas Regulator Co. 281

METER HANGER CATALOG
Mueller Co. 7

PERFORMANCE IS PROOF
Groble Gas Regulator Co. 175

(Continued on page 102)

Electrolux chosen for over

11,000

REMODELED APARTMENTS

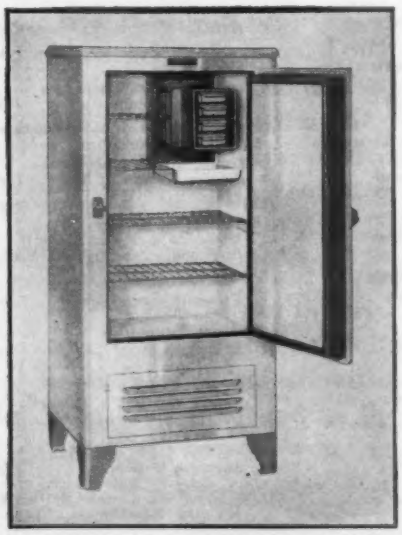
in New York City alone!

Installation of Electrolux refrigerators to replace old-fashioned iceboxes increases sendout 198,000 MCF

TODAY the owner of the old-fashioned apartment house who hopes to compete with modern, recently completed buildings is forced to remodel. This is a comparatively simple matter since the installation of automatic refrigeration is often the only necessary big addition. And last year—in New York City alone—owners of 11,000 of these remodeled apartments picked Electrolux!

Here, then, is a particularly important market for every gas company to cultivate. Because each Electrolux installed adds 1500 cu. ft. a month to the domestic load. Gives the gas company a generous profit from the sale itself. And, in addition, provides a strong impetus to the sale of other gas appliances to complete the remodeling.

October 1 is close at hand. The owners of icebox-equipped apartments are already beginning to worry about the fall's tenant turnover. They know that tenants will be deserting them . . . that renting to new tenants will be harder than ever . . . unless they remodel. That's your opportunity to give them a strong sales presentation on Electrolux. We've prepared a series of sales pieces that will help you start, follow up and close profitable sales in your territory. So don't wait. Ask us about them today. Write, wire or telephone Electrolux Refrigerator Sales, Inc., Evansville, Indiana



The popular Kitchenette Model Electrolux, one of the many models which will increase your domestic load approximately 1500 cu. ft. a month.

ELECTROLUX

THE *Gas* REFRIGERATOR

Major Conduit Operations simplified by the ARMCO Jacking Method

For lines of the Iroquois Gas Corporation, Buffalo, N. Y., 624 feet of Armco Corrugated Iron Pipe were installed under 40 railroad tracks by the Armco Jacking Method. Pictured is one of the openings through which the pipe was lowered into jacking position.

WHERE important major openings (as well as smaller ones) must be made for conduits under railroad tracks or busy highways, both immediate and future economy as well as simplified, labor-saving installation, dictates the modern Armco Jacking Method, using durable Armco Corrugated Iron Pipe. Public utility, gas and other companies use it to the exclusion of traffic-delaying, costly open trenching.

The Armco Jacking Method keeps traffic moving, avoids loss of workmen's time and saves from 30 to 50 per cent of installation costs. It eliminates injury to adjoining buildings because there is no backfill to settle.

Armco Corrugated Iron Pipe, with an unequalled 24-year record of service in the ground to date, is logically the more economical product to install. It has been in continuous use since 1906, under every condition of soil, water and pressure. Data and installation information on the Armco Jacking Method, an Armco development, will be sent on request. Write to Drainage Headquarters.

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand.

ARMCO CULVERT MANUFACTURERS ASS'N.
Middletown, Ohio.

C, 1930, A.C.M.A.

TRADE CATALOGS

(Continued from page 100)

POCKET HAND BOOK—DIRECTIONS FOR SETTING AND OPERATING FULTON GAS REGULATORS
The Chaplin Fulton Mfg. Co. 249

REGULATOR CATALOG
Mueller Co. 3

REGULATOR CATALOG
Reynolds Gas Regulator Co. 37

REGULATORS FOR HIGH & MEDIUM PRESSURES
Sprague Meter Co. 225

RELIANCE BALANCE VALVE DISTRICT REGULATOR
Isbell Porter Co. 135

SINGLE DISTRICT & DOUBLE DISTRICT REGULATORS
Isbell Porter Co. 136
Reynolds Gas Regulator Co. 280

RELIANCE LOW PRESSURE OR APPLIANCE REGULATORS

REFRACTORIES

BIASBRIX
General Refractories Co. 8

CEMENTING JAMP JOINTS
Quigley Furnace Specialties Co. 150

CHOOSING A HIGH TEMPERATURE CEMENT
General Refractories Co. 11

GENUINE HIGH TEMPERATURE CEMENT, A
General Refractories Co. 10

GREFCO CHROME HIGH TEMPERATURE CEMENT
General Refractories Co. 12

HIGH TEMPERATURE CEMENT IN THE GAS PLANT
Quigley Furnace Specialties Co. 158

HOT PATCHING RETORTS
Quigley Furnace Specialties Co. 160

HYTEMPITE IN THE GAS PLANT
Quigley Furnace Specialties Co. 163

HYTEMPITE IN THE POWER PLANT
Quigley Furnace Specialties Company 408

METHODS OF RESEARCH NEWLY APPLIED TO REFRACTORIES
General Refractories Co. 9

PROTECT YOUR PLANT & EQUIPMENT —A PROTECTIVE COATING
Quigley Furnace Specialties Co. 161

QUICK CARBURETOR REPAIRS MADE HYTEMPITE
Quigley Furnace Specialties Co. 157

QUIGLEY REFRACTORY GUN, THE
Quigley Furnace Specialties Co. 162

QUIGLEY ACID PROOF CEMENT
Quigley Furnace Specialties Co., Inc. 310

REFRACTORIES (CATALOG OF)
General Refractories Co. 25

STANDARD SILICA BONDING CEMENT
General Refractories Co. 277

BETTER BOILER BRICK WORK & MONOLITHIC CONSTRUCTION
Refractory and Engineering Corp. 409

R & E STIC-TITE MONOLITE CEMENT FOR HEAT INSULATION
Refractory and Engineering Corp. 410

PIPE

AUTOGENOUS WELDING OF NATIONAL PIPE
National Tube Co. 411

CAST IRON PIPE
United States Cast Iron Pipe & Foundry Co. 149

CAST IRON PIPE & FITTINGS
McWane Cast Iron Pipe Co. 203

COUPLINGS AND SPECIALTIES FOR NATURAL GAS
S. R. Dresser Mfg. Co. 43

COUPLINGS FOR MANUFACTURED GAS MAINS
S. R. Dresser Mfg. Co. 42

FOR EVERY JOINT ON THE LINE
Victaulic Co. of Amer. 13

WESTLING VALVE
Bartlett Hayward Co. 275

WOODALL-DUCKHAM VERTICAL RETORTS
Isbell Porter Co. 143

PIPE LAYING MANUAL
Southwestern Pipe Joint & Eng. Co. 364

POCKET CATALOG AND MEMO BOOK
Southwestern Pipe Joint & Eng. Co. 365

PIPE LAYING MANUAL
Southwestern Pipe Joint & Eng. Co. 412

POCKET CATALOG & MEMO BOOK
Southwestern Pipe Joint & Eng. Co. 413

BLOWERS

CONNERSVILLE GAS EXHAUSTERS, BOOSTERS AND METERS
The Connersville Blower Co. 60

CONNERSVILLE POSITIVE PRESSURE BLOWER
The Connersville Blower Co. 332

CONNERSVILLE CYCLOIDAL PUMPS
The Connersville Blower Co. 333

COVERS INDUSTRY LIKE A BLANKET
The P. H. & M. M. Roots Co. 218

HANDBOOK OF CAST IRON PIPE (DISTRIBUTED TO GAS OFFICIALS AND ENGINEERS ONLY)
Cast Iron Pipe Research Assn. 178

HANDBOOK OF CAST IRON PIPE FOR GAS SERVICE
United States Cast Iron Pipe & Foundry Co. 148

HANDBOOK OF DE LAVAUD CENTRIFUGALLY CAST IRON PIPE
United States Cast Iron Pipe and Foundry Co. 146

JOINTS ON DE LAVAUD CAST IRON PIPE FOR GAS SERVICE
United States Cast Iron Pipe and Foundry Co. 147

PIPE COUPLINGS
Victaulic Co. of Amer. 13

STEEL PIPE COUPLINGS
S. R. Dresser Mfg. Co. 41

STREET DEPARTMENT SUPPLIES
Safety Gas Main Stopper Co. 261

MONEL WET TYPE METERS
Superior Meter Co. 223

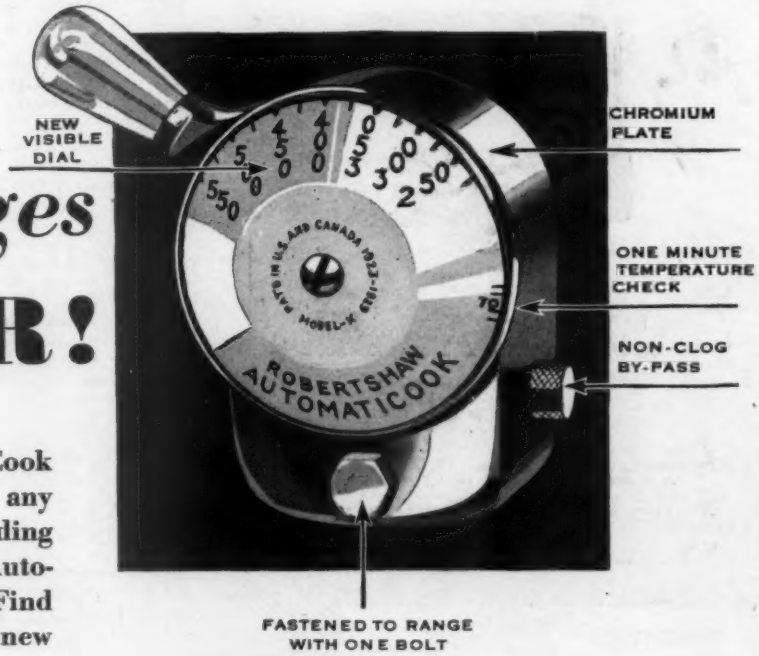
PIPE (Coatings, Couplings, Joints, Welding Equipment)

EMCO DEMAND METER
Pittsburgh Equitable Meter Co. 268

EMCO LARGE CAPACITY POSITIVE GAS METERS
Pittsburgh Equitable Meter Co. 266

(Continued on page 104)

The NEW "K" *Type* AutomatiCook *is selling Gas Ranges* FASTER!



THE new "K" Type AutomatiCook is a definite selling point on any range. And more than 100 leading makes of gas ranges will be AutomatiCook equipped this year. Find out the selling arguments of the new AutomatiCook—*now!*

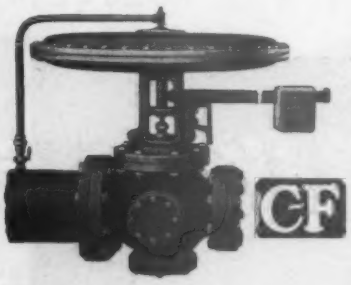
It's smaller, more compact, better looking. Chromium plated. A full vision dial. An absolutely foolproof One-Minute Temperature Check. A non-clog by-pass. Only *one* bolt secures the AutomatiCook to the range. The AutomatiCook is so designed that temperature setting, calibrating and all working parts are accessible from outside the range.

Study up on the new AutomatiCook, now. Write for our descriptive literature. We'll be glad to send this literature to your salesmen and service men, too. Just send us their names. But write *now*—if you want to make selling of gas ranges easier this year!

ROBERTSHAW AutomatiCook

ROBERTSHAW THERMOSTAT COMPANY
Youngwood, Penna.

Always
ON THE JOB!



The C-F Automatic Cut-Off

IT automatically closes the ports of the regulator valve. The valves have to be opened by hand before the flow of gas resumes.

No chance for dangerous explosions.

If the diaphragm of the regulator should burst, this cut-off would stop the flow of gas immediately.

More than forty-five years of experience in controlling gas pressure has taught us how to make this device dependable in its operation.

The Chaplin-Fulton Mfg. Co.

Organized 1884—Oldest Builders of Gas Regulators in the Country. Built in All Sizes, from 1 Inch to 24 Inches; For all Services, 1 oz. up to 2,000 lbs. Pressure to Square Inch.

28-40 Penn Avenue, Pittsburgh, Pa.

TRADE CATALOGS

(Continued from page 102)

EMCO NO. 5 LARGE CAPACITY PRESSED STEEL GAS METER
Pittsburgh Equitable Meter Co. 267

FIELD DIRECTIONS FOR APPLYING BITUMASTIC ENAMEL
Wailes Dove-Hermuston Corpn. 201

HIGH TEST WELDING ROD
The Linde Air Products Co. 82

LONG PIPE LINES WITH OXWELDED JOINTS
The Linde Air Products Co. 81

MILE AFTER MILE
Wailes Dove-Hermiston Corpn. 200

OXWELD
The Linde Air Products Co. 83

OXY-ACETYLENE TIPS
The Linde Air Products Co. 80

PROTECTION FOR SERVICES AND OTHER SMALL DIAMETER PIPE
Wailes Dove-Hermiston Corpn. 199

PROTECTION OF OIL & GAS LINES
Wailes Dove-Hermiston Corpn. 334

ARMCO CULVERTS AND DRAINAGE PRODUCTS
Armco Culvert Mfrs. Assn. 414

REDUCING THE COST OF CULVERT PLACEMENT
Armco Culvert Mfrs. Assn. 415

METERS

APPARATUS BULLETINS
American Meter Co. 119

CAST IRON GAS METERS
Sprague Meter Co. 284

DISPLACEMENT AND ORIFICE MEASUREMENT
American Meter Co. 335

EMCO STANDARD DOMESTIC AND CURB BOX METERS
Pittsburgh Equitable Meter 416

EMCO TIN METER
Pittsburgh Equitable Meter Co. 269

INSTRUCTIONS FOR CONNERSVILLE TANDEM METERS
The Connersville Blower Co. 337

INSTRUCTION FOR THE INSTALLATION AND OPERATION OF CONNERSVILLE ROTARY DISPLACEMENT METERS
Connersville Blower Co. 341

INSTRUCTIONS FOR THE MAXIMUM DEMAND RECORDER
The Connersville Blower Co. 336

INSTRUCTIONS FOR THE USE OF THE P. U. T. T. RECORDING GAUGE
The Connersville Blower Co. 342

IRONCLAD CAST IRON DRY GAS METER
Pittsburgh Equitable Meter Co. 264

DREADNAUGHT TYPE METERS
Sprague Meter Co. 227

GAS METERS AND APPARATUS
Lambert Meter Co., Inc. 173
American Meter Co. 338

INSTRUCTIONS FOR THE PROVING AND TESTING OF METERS
American Meter Co. 120

LINDERMAN LARGE VOLUME GAS METERS
American Meter Co. 339

METER CATALOG
American Meter Co. 121

METERS AND DIAPHRAGMS
Superior Meter Co. 224

"METRIC" FLOW METERS
American Meter Co. 343

RECORDING DEMAND FLOWMETER
Lambert Meter Co. 17?

DEMAND GAS METERS
Bulletin 13—Sprague Meter Co. 305

"WESTCOTT" ORIFICE METERS
American Meter Co. 344

CLEVELAND TRENCHERS
Cleveland Trencher Co. 417

Gas Appliances

INCINERATION

INCINERATOR SALES MANUAL
Kernit Incinerator Co. 360

YOUR NEXT MOVE
Kernit Incinerator Co. 361

A GOLDEN OPPORTUNITY IN YOUR HAND
Kernit Incinerator Co. 362

SALESMEN'S CATALOG SHEET
Kernit Incinerator Co. 150

SAID ONE NEIGHBOR TO ANOTHER
Kernit Incinerator Co. 151

MODERN DISPOSAL OF WASTE
Kernit Incinerator Co. 152

ARCHITECTS AND BUILDERS FOLDER
Kernit Incinerator Co. 156

INDUSTRIAL EQUIPMENT

AUTOMATIC BOILER FEED SYSTEMS
P. M. Lattner Mfg. Co. 287

GAS FIRED HIGH PRESSURE BOILERS
P. M. Lattner Mfg. Co. 286

PROFITABLE BAKING
Bruce McDonald Co. 39

THE RED DEVIL OVEN
Bruce McDonald Co. 38

LINOTYPE TEMPERATURE CONTROL
Robertshaw Thermostat Co. 418

MONOTYPE TEMPERATURE CONTROL
Robertshaw Thermostat Co. 419

METAL MELTING POT TEMPERATURE CONTROLLER
Robertshaw Thermostat Co. 420

HOUSE HEATING

ARCHITECT'S CATALOG
American Gas Products Corpn. 246

BOILER TRADE CATALOG
American Gas Products Corpn. 245

BOILER CONSUMER CATALOG
American Gas Products Corpn. 244

HEAT WITH GAS
Franklin Gas Appliance Co. 4

HOMESTEAD FIRES
The Homestead Heater Co. 19

HOUSE HEATING DATA BOOK
Roberts-Gordon Appliance Corp. 340

IDEAL GAS BOILER HANDBOOK
American Gas Products Corpn. 243

SELL HEALTH AND COMFORT IN THE HOME
Roberts Gordon Appliance Co. 422

(Continued on page 109)

It Is a GOOD Gas Range That Has This Red Wheel

Patents Pending

TIFFIN model CASH PRICE $99.75 ($112.75 West of the Rockies)

Patents Pending

PATRICIAN model CASH PRICE $195.00 ($210 West of the Rockies)

A New Magic Chef Model at an Attractive Moderate Price

SOMETHING we have always wished for but thought it couldn't be produced!" That's what dealers who have seen the new TIFFIN Model say about this new member of the Magic Chef family.

Priced under $100, this new Magic Chef, in a more compact and convenient size, brings Magic Chef charm and style within reach of thousands of women who could not afford the larger models.

The September 20th issue of the Saturday Evening Post will carry a double page advertisement, in full color, of the Tiffin Model. Page advertisements in color in other leading magazines just before and after the Post announcement will attract wide-spread interest to this remarkable gas range achievement.

Tie up your store to this important national advertising to get your full share of the substantial demand that will be created for the Tiffin Model of the Magic Chef. There is nothing in the gas range field today that can match it at the price. It will pay you to get full details.

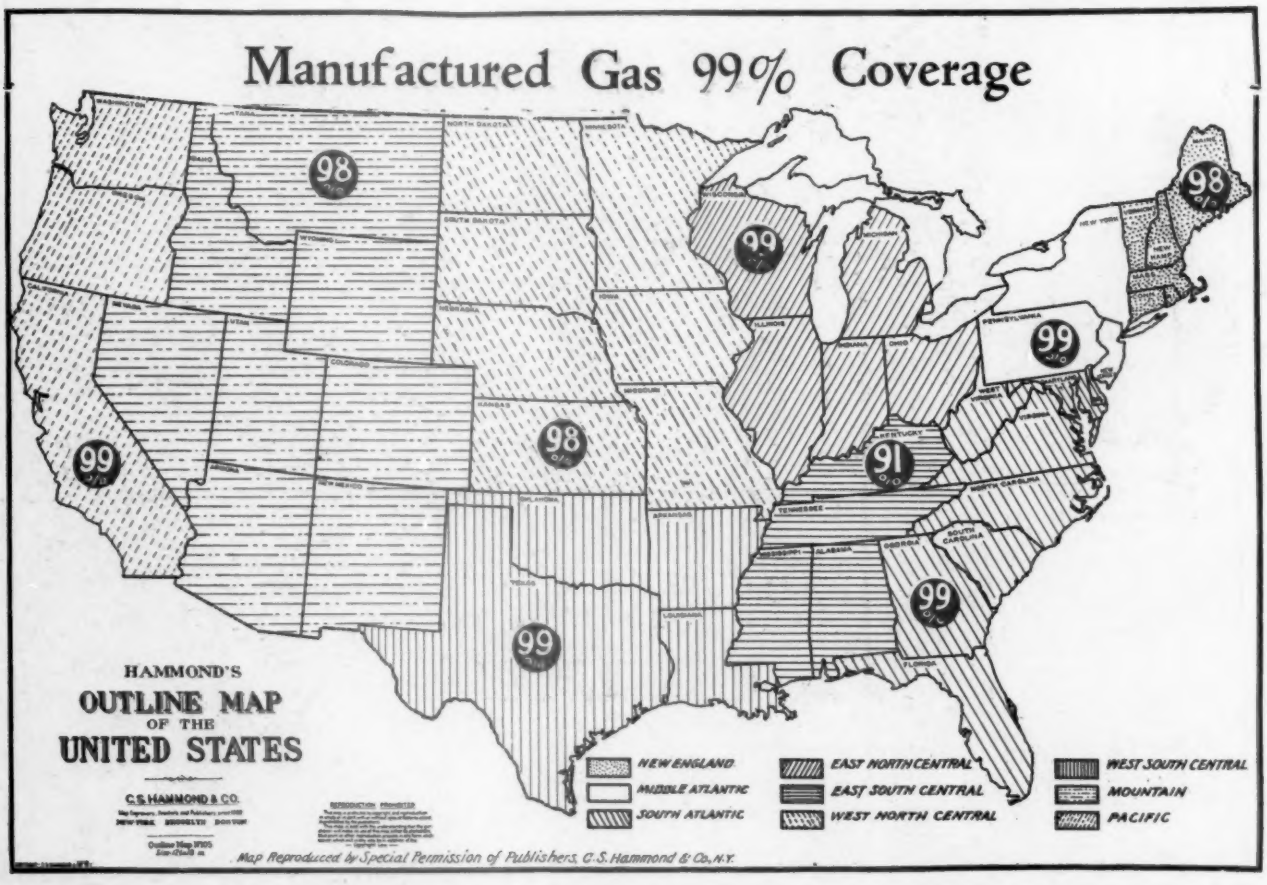
Send name and address for free copy of booklet showing modern kitchens.

Magic Chef

AMERICAN STOVE COMPANY... DEPT. B, 801 CHOUTEAU AVENUE, ST. LOUIS, MO.

LARGEST MAKERS OF GAS RANGES IN THE WORLD

Reach This Immense



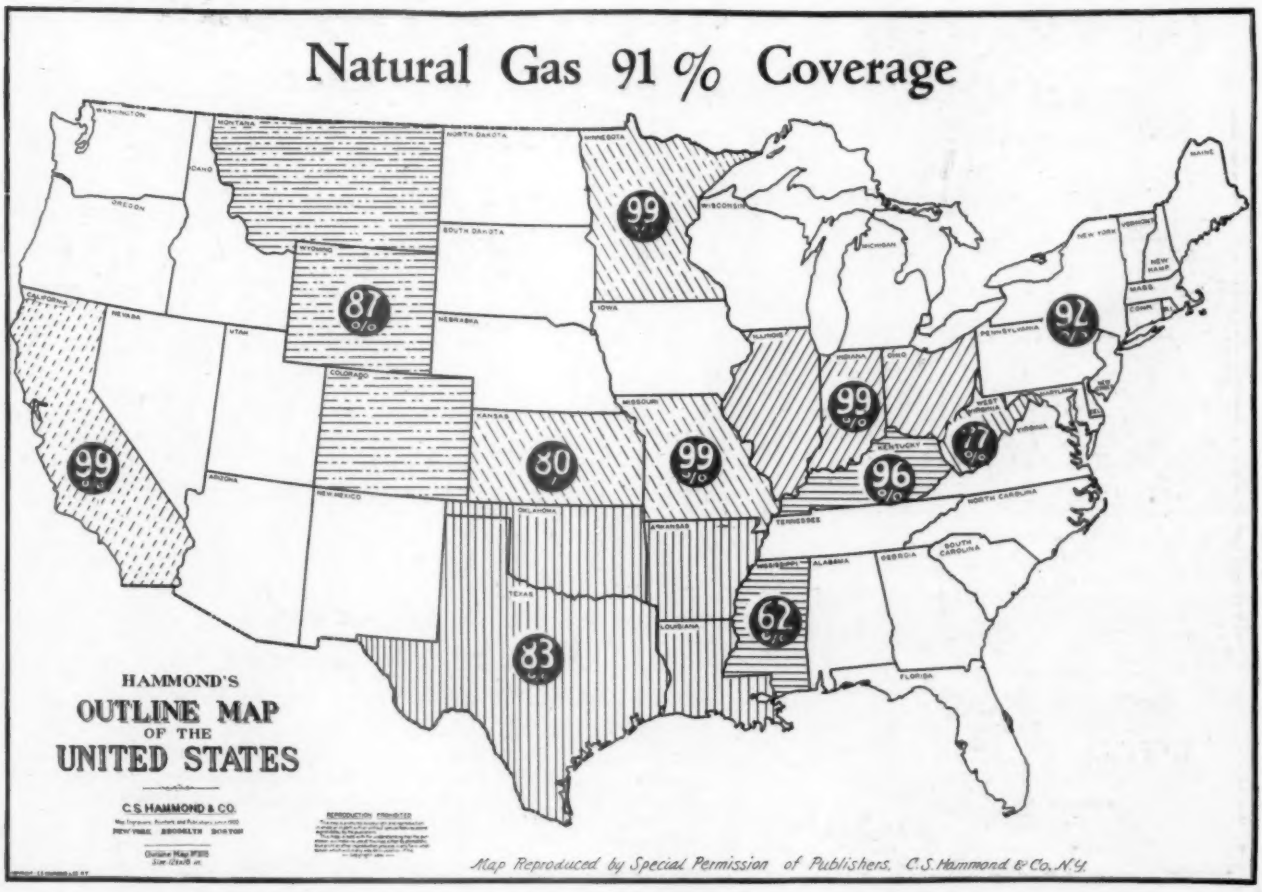
The American Gas Journal Covers 95% of the Com

This 95% average National Coverage is the result of a recent intensive analysis of the paid circulation of the American Gas Journal, which shows a 99% coverage of the buying power in the Manufactured and Mixed Gas territory, and a 91% coverage in the strictly Natural Gas territory.

The figures in each section of the maps shown above indicate the buying power coverage in that section by paid subscriptions to the American Gas Journal. The sections are divided in accordance with the A.B.C. circulation statement practice.

The Journal is the only monthly publication serving the gas industry with such a nation-wide circulation. It is not the official organ of any association.

Buying Power!!



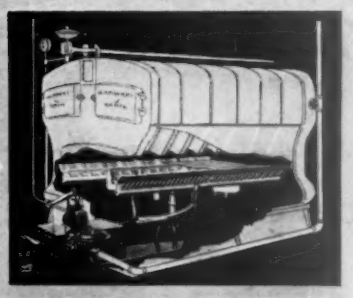
bined Manufactured and Natural Gas Industry

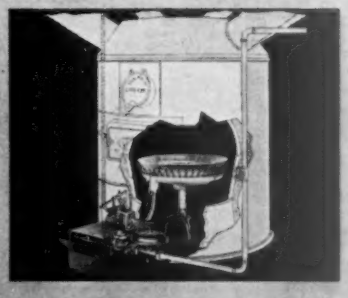
In addition to reaching the 95% of the industry with the regular mail edition of the October issue, a thousand extra copies will be distributed amongst the gas men who attend the Annual convention of the American Gas Association at Atlantic City, N. J., October 13th to 19th. They will see your exhibit at the convention, and your advertisement in the Journal will be a reminder when they get back to their offices. Thus it will also constitute the second call of your representative on every gas man who reaches your booth. Your one announcement in a monthly will work for you the entire 30 days.

Make Your Reservation for October number at ONCE

AMERICAN GAS JOURNAL 53 Park Place, New York City

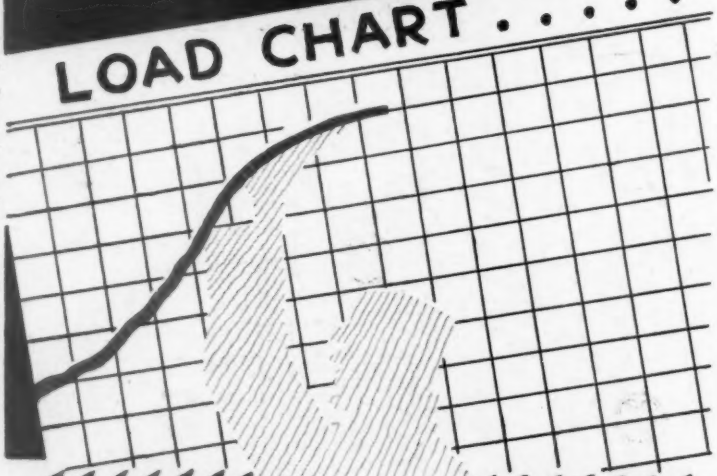
THE PHANTOM FIREMAN





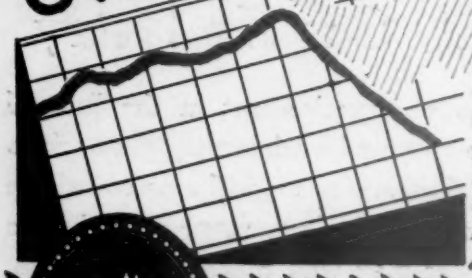
Boosts Your Load . . . .

LOAD CHART . . . . .



Cuts Your Overhead . .

OVERHEAD CHAR



The Public are ready for clean heating efficiency . . .

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Mr. Home Owner is simply waiting for help in the selection of the right conversion type burner.

The burner which delivers to the user the highest degree of heating freedom and comfort with the greatest ecomomy of operation will, at the same time, become a money-maker for you.

The COLUMBIA is that burner.

It offers the lowest installation cost and makes no service demands.

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Write us. Let us send you all the information and figures, also details of our merchandising plan.

We will help you sell gas for heating and do it at a bigger profit.

THE COLUMBIA BURNER CO.
1645 Dorr Street
Toledo, Ohio

The Burner That Demands No Service

COLUMBIA Gas Burner

THE GEM OF THEM ALL

TRADE CATALOGS

(Continued from page 101)

RANGES

THE CAREFREE HOSTESS
American Stove Co. 252

SUNDAY DINNER
American Stove Co. 251

THE SECRET OF HAPPY HOMES
American Stove Co. 250

GAS RANGES
American Stove Co. 253

ADVERTISING MANUAL
George D. Roper Co. 48

MERCHANDISING GAS APPLIANCES TO THE HOUSEWIFE
Geo. D. Roper Corpn. 49

RANGE CATALOG
Geo. D. Roper Corpn. 51

RANGE CATALOG
New Process Stove Co. 260

RANGE CATALOG
Dangler Stove Co. 261

RANGE CATALOG—ORIOLE GAS RANGES
Standard Gas Equipment Corpn. 346

RANGE CATALOG—SMOOTH TOP GAS RANGES
Standard Gas Equipment Corpn. 347

RANGE CATALOG—ACORN GAS RANGES
Standard Gas Equipment Corpn. 348

RANGE CATALOG—VULCAN HEAVY DUTY COOKING EQUIPMENT
Standard Gas Equipment Corpn. 349

ROPER GAS RANGES—APPLIANCES
Geo. D. Roper Corpn. 288

SALESMAN'S MANUAL
Geo. D. Roper Corpn. 50

SNAP ACTION THERMOSTAT FOR STORAGE WATER HEATERS & HOUSE-HEATING EQUIPMENT
Robertshaw Thermostat Co. 400

THROTTLING TYPE WATER HEATER THERMOSTAT
Robertshaw Thermostat Co. 401

THERMOSTAT FOR SPACE HEATERS, GARAGE HEATERS, ETC.
Robertshaw Thermostat Co. 402

VULCAN GAS APPLIANCES
Standard Gas Equipment Corpn. 350

PILOTS & CONTROL

SAFETY PILOTS FOR CIVIL WATER HEATERS
Spencer Thermostat Co. 403

SAFETY PILOTS FOR BARBER BURNERS
Spencer Thermostat Co. 404

THERMOSTATS FOR CONVERTING TANK WATER HEATERS INTO AUTOMATIC STORAGE SYSTEM
Spencer Thermostat Co. 405

SELF-CLOSING TEMPERATURE RELIEF VALVES FOR THE PROTECTION OF HOT WATER BOILERS
Spencer Thermostat Co. 406

REFRIGERATION

SECRET OF SILENCE IN REFRIGERATION
Servel Sales, Inc. 301

WATER HEATING

THE UTILITY
F. G. Corbus 376

CONSTANT HOT WATER
Welsbach Co. 72

KOMPAK BOOK
Kompak Co. 263

WARM FRIENDS (RADIANT GAS HEATERS)
Welsbach Co. 71

BOOK OF REFERENCE FOR DEALERS AND ARCHITECTS
Humphrey Co. 274

BUILD BIGGER YEAR ROUND BUSINESS
Humphrey Co. 7

GAS WATER HEATERS
Humphrey Co. 6

PAINT

ASPHALTUM BASE PAINTS
Cheesman-Elliot Co., Inc. 31

CE-CO-PAINTS FOR PUBLIC SERVICE PLANTS
Cheesman-Elliot Co., Inc. 34

COLOR HARMONY
Cheesman-Elliot Co., Inc. 26

EXTERIOR BUILDING PAINTS
Cheesman-Elliot Co., Inc. 30

HEAT RESISTING PAINTS
Cheesman-Elliot Co., Inc. 32

LOW VISIBILITY—(PAINT)
Cheesman-Elliot Co., Inc. 27

METAL PRESERVATIVE PAINTS
Cheesman-Elliot Co., Inc. 29

PAINTS FOR RESISTING STAINS AND DAMPNESS
Cheesman-Elliot Co., Inc. 28

QUIGLEY TRIPLE-A PROTECTIVE COATINGS
Quigley Furnace Specialties Co. 345

TECHNICAL PAINTS
Cheesman-Elliot Co., Inc. 28

MANUAL—FOR HOLDER PROTECTION
Inertol Co. 363

PROTECT AND DECORATE
Quigley Furnace Specialties Co. 407

MISCELLANEOUS

ALCO CARBIDE GAS BURNERS, FIXTURES AND LIGHTING ACCESSORIES
American Lava Corpn. 36

EDITOR, AMERICAN GAS JOURNAL, 53 PARK PLACE, NEW YORK

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Company .....

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HUNT

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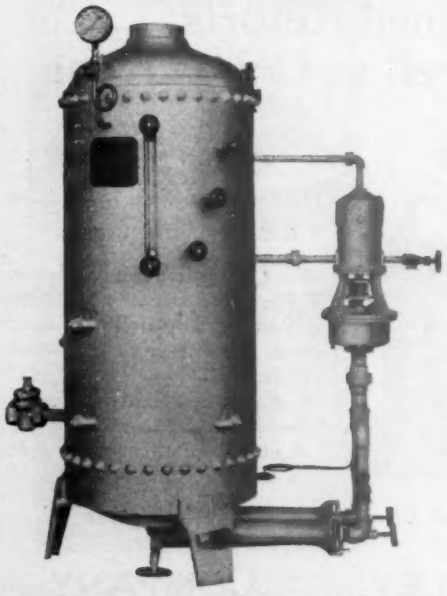

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Wet Meters
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Apparatus

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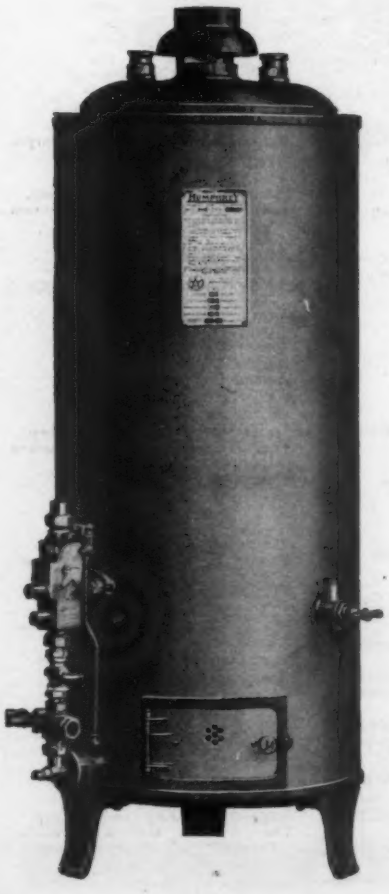
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

HUMPHREY SALES FOR 1930 ARE SHOWING A SUBSTANTIAL INCREASE OVER THE SAME PERIOD OF LAST YEAR

There IS a reason



That reason can be summed up in a few words. Humphrey builds a quality product, and backs it up with real advertising and merchandising cooperation.

The impressive record of Humphrey sales during the past few months, is ample proof that a quality water heater, backed by a real sales effort, can be sold, regardless of business conditions.

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HUMPHREY COMPANY
DIV. RUUD MFG. CO.
KALAMAZOO, MICHIGAN

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See page 123 for advertisements of these products

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The Western Gas Construction Company.

ACCUMULATORS—STEAM
The Gas Machinery Co.
Ruth's Steam Accumulator Co.
Smoot Engineering Corp.
The Western Gas Construction Company.
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The Prest-O-Lite Co., Inc.
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American Lava Corp.

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Bartlett Hayward Co.
Cruse-Kemper Co.
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Isbell-Porter Company.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
John S. Unger.
The Western Gas Construction Company.

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The Gas Machinery Co.
Semet-Solvay Engineering Corp.

AMMONIA PIPE
National Tube Company.

AMMONIA RECOVERY APPARATUS
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.

AMMONIA STILLS
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Cruse-Kemper Co
The Gas Machinery Co.
Isbell-Porter Company.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
John S. Unger.
The Western Gas Construction Company.

AMMONIA TEST
American Meter Co.

APPRAISALS & INVENTORIES
Stacey Bros. Gas Construction Co.
United Engineers & Constructors, Inc.

APPARATUS
Laboratory Experimental
American Meter Co.
Service
American Meter Co.

ASH REMOVAL EQUIPMENT
Research Corpn.

ASH STORAGE BINS
C. W. Hunt Co., Inc.
Semet-Solvay Engineering Corp.
McClintoc-Marshall Co.
The Stacey Mfg. Co.

AUDITS
United Engineers & Constructors, Inc.

AUTOMATIC CONTROLS FOR WATER GAS APP.
The Brown Instrument Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Co.

AUTOMATIC RAILWAYS
C. W. Hunt Co., Inc.

BACK PRESSURE VALVES
Connelly Iron Sponge & Governor Co.
Chaplin Fulton Mfg. Co.

BACKRUN GAS EQUIPMENT
Semet-Solvay Engineering Corp.
The Western Gas Construction Co.

BAGS
Safety Gas Main Stopper Co.

BAROMETERS
The Bristol Company
Connelly Iron Sponge & Governor Co.
Precision Thermometer & Instrument Company.

BENCHES
Improved Equipment-Russell Engineering Corp.
Isbell-Porter Company.
The Gas Machinery Co.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

BENZOL
Bartlett-Hayward Co.
The Koppers Construction Co.

BENZOL RECOVERY PLANTS
Semet-Solvay Engineering Corp.

BLOW TORCHES, ACETYLENE
The Prest-O-Lite Co., Inc.

BLOWERS
Connersville Blower Co., The.
Gas Engineering Co.
The Gas Machinery Co.
Pittsburgh Equitable Meter Co.
The P. H. & F. M. Roots Company.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

BLUE GAS PLANT
Bartlett-Hayward Co.
Gas Engineering Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

BOILER FEED SYSTEMS
P. M. Lattner Mfg. Co.

BOILERS (GAS FIRED)
P. M Lattner Mfg. Co.

BOILERS—WASTE HEAT
Bartlett-Hayward Co.
Improved Equipment-Russell Engineering Corp.
Isbell-Porter Company.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Company.

BOOSTERS
Connelly Iron Sponge & Governor Co.
Connersville Blower Co., The

BRICK
Fire and Checker
The Gas Machinery Co.
General Refractories Co.
Improved Equipment Co.-Russell Eng. Corp.
United Engineers & Constructors, Inc.
United States Refractories Corp. Silica
The Western Gas Construction Co.
The Gas Machinery Co.
General Refractories Co.
Improved Equipment-Russell Engineering Corp.
E. J. Lavino & Company.
United States Refractories Corp. High Alumina
General Refractories Co.

BRUSHES, PIPE CLEANING
Safety Gas Main Stopper Co.

B. T. U. INDICATORS
Alpha-Lux Co.

BUILDINGS
United Engineers & Constructors, Inc.
The Western Gas Construction Co.

BURNERS (Industrial)
American Lava Corp.
Conversion House Heating
Roberts Gordon Appliance Corpn.
Fuel
Philfuels Co.

BY-PRODUCT COKE
Semet-Solvay Co.

BY-PRODUCT PLANTS
Bartlett-Hayward Co.
The Gas Machinery Co.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
West Gas Improvement Co.
The Western Gas Construction Co.

CABLE RAILWAYS
C. W. Hunt Co., Inc.
Alpha-Lux Company.
American Meter Co.
Superior Meter Co.

CALORIMETERS
American Meter Co.

CALCIUM CARBIDE
Union Carbide Sales Co.

CALCIUM CARBIDE
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CARBIDE
Union Carbide Sales Co.

CARBONIZATION
The Gas Machinery Co.

CARBURETTED WATER GAS PLANTS
Bartlett-Hayward Co.
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Co.

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C. W. Hunt Co., Inc.
The Western Gas Construction Co.

CASING, STEEL
Republic Steel Corp.

CASINGS, SEAMLESS STEEL
National Tube Co.

CAST IRON PIPE
Bell & Spigot
Cast Iron Pipe Research Ass'n
United States Pipe & Foundry Co.
The Western Gas Construction Co.

CEMENTS
Acid-proof
General Refractories Co.
Quigley Furnace Spec. Co., Inc.
Firebrick
Refractory & Engineering Corpn.
Corpn.
General Refractories Co.
Improved Equipment-Russell Engineering Corp.
United States Refractories Corp.
High Temperature
Alpha-Lux Company.
General Refractories Co.
E. J. Lavino & Co.
Quigley Furnace Spec. Co., Inc.
Refractory & Engineering Corp.
United States Refractories Corp.
Refractory
General Refractories Co.
Improved Equipment-Russell Engineering Corp.
E. J. Lavino & Co.
Refractory & Engineering Corpn.
United States Refractories Corp.
Silica
General Refractories Co.
Quigley Furnace Specialties Co.

CHAMBER OVENS
United Engineers & Constructors, Inc.

CHARGING MACHINERY
Bartlett-Hayward Co.
The Gas Machinery Co.
Improved Equipment-Russell Engineering Corp.
Isbell-Porter Company.
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.

CHUTES
C. W. Hunt Co., Inc.
McClintoc Marshall Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.

CLAMPS (PIPE)
S. R. Dresser Mfg. Co.

CLOCKS & WATCHES, Stop
American Meter Co.

COALS
Boone County Coal Corpn.

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Bartlett-Hayward Co.
The Gas Machinery Co.
Improved Equipment-Russell Engineering Corp.
Isbell-Porter Company.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
West Gas Improvement Company
The Western Gas Construction Company.

COAL & COKE BINS CASTINGS
The Koppers Construction Co.
The Stacey Mfg. Co.
The Western Gas Construction Co.

COAL AND COKE HANDLING MACHINERY
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C. W. Hunt Co., Inc.
Isbell-Porter Company.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
United Engineers & Constructors, Inc.

COAL TAR PRODUCTS
The Koppers Construction Co.
Semet-Solvay Engineering Corp.

COAL TUBES
C. W. Hunt Co., Inc.
Meter
Superior Meter Co.

COKE CRUSHERS
The Koppers Construction Co.

COKE QUENCHING
The Koppers Construction Co.
Semet-Solvay Engineering Corp.

COKE RECLAMATION SYSTEMS
C. W. Hunt Co., Inc.

COMPUTERS
Heating Value
United Engineers & Constructors, Inc.

CONDENSERS
Andale Co.
Bartlett-Hayward Co.
Cruse-Kemper Co.
Gas Engineering Co.
The Gas Machinery Co.
Isbell-Porter Company.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
The Western Gas Construction Company.
High Duty
Stacey Bros. Gas Const. Co.
United Engineers & Constructors, Inc.
Wolverine Tube Co.

CONTRACTORS' TUBS
C. W. Hunt Co., Inc.

CONTROLS
The Bristol Company.
The Brown Instrument Co.
Robertshaw Thermostat Co.
Combustion
Smoot Engineering Corp.
Gas Pressure
Smoot Engineering Corp.
Gas Producer
Smoot Engineering Corp.
Water Gas Machine
Smoot Engineering Corp.

CONVEYORS
C. W. Hunt Co., Inc.
Isbell-Porter Company.
The Koppers Construction Co.

CONVERSION UNITS
Roberts Gordon Appliance Corpn.

COOLERS
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.
Air
Andale Company.
Ammonia Liquor
Andale Company.
Gas
Andale Company.
Oil
Andale Company.
Water to Water
Audale Company

COOLING COILS
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.

COUPLINGS
Bartlett-Hayward Co.
S. R. Dresser Mfg. Co.
National Tube Co.
Pittsburgh Equitable Meter Co.
The P. H. & F. M. Roots Company.
Victaulic Co. of Amer.

COUPLINGS—FLEXIBLE
The P. H. & F. M. Roots Company.

CUBIC FOOT BOTTLES
American Meter Co.
Lambert Meter Co.

CUTTING APPARATUS & SUPPLIES
Union Carbide & Carbon Co.

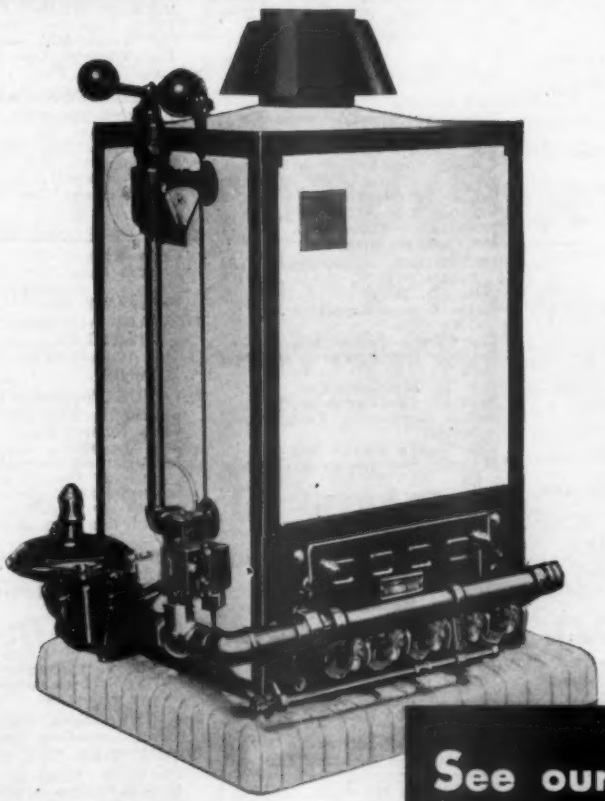
CRUSHERS
McClintoc Marshall Co.

DE-EMULSIFIERS
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.

DEHYDRATORS, GAS
Andale Company.

IDEAL GAS BOILERS

★ All of the prestige of American Radiator Company is back of every Ideal Gas Boiler—a fact that appeals instantly to every prospect.



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division of

AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

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AMERICAN GAS PRODUCTS CORPORATION

Chrysler Building, New York

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See page 123 for advertisements of these products

Semet-Solvay Engineering Corp.
West Gas Improvement Co.
The Western Gas Construction Company.

DEMONSTRATION METERS
American Meter Co.
Lambert Meter Co.

DIAPHRAGMS (Meter)
American Meter Co.
Lambert Meter Co.
Superior Meter Co.

DISCHARGING MACHINERY
Bartlett-Hayward Co.
Improved Equipment-Russell Engineering Corp.
Semet-Solvay Engineering Corp.

DRAFT GAUGES
The Bristol Company
Brown Instrument Co., The
Precision Thermometer & Instrument Company.

DUPLEX HEATING SYSTEMS
Roberts-Gordon Appliance Corpn.

ELECTRIC LOCOMOTIVES
C. W. Hunt Co., Inc.

ELEVATORS
C. W. Hunt Co., Inc.

ENGINEERS
American Meter Co.
The Gas Machinery Co
Southwestern Pipe Joint & Eng. Co.
Combustion
Bartlett-Hayward Co.
The C. M. Kemp Mfg. Co.
Smoot Engineering Corp.
United Engineers & Constructors Inc.
Consulting
Bartlett-Hayward Co.
Edw. A. Dieterle
United Engineers & Constructors. Inc.
The Western Gas Construction Company.
Contracting
Bartlett-Hayward Co.
Cruse-Kemper Co.
Gas Engineering Company.
C. W. Hunt Co., Inc.
Improved Equipment
Russell Engineering Corpn.
Isbell-Porter Company
McClintoc Marshall Co.
Stacey Gros. Gas Const. Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Company.
Distribution
United Engineers & Constructors, Inc.
Measurement
American Meter Co.
Connersville Blower Co.

EXHAUSTERS
Connersville Blower Co., The
The Gas Machinery Co.
Isbell-Porter Company.
The P. H. & F. M. Roots Company.
The Western Gas Construction Company

EXPANSION BENDS
The Gas Machinery Co.
Semet-Solvay Engineering Corp.

FILTERS, Gas
American Meter Co.

FIREBRICK CEMENT
General Refractories Co.
Quigley Furnace Specialties Co., Inc.
Refractory & Engineering Corp.

FIREBRICK CHECKER BRICK (See Brick)
The Gas Machinery Co.
General Refractories Co.
Improved Equipment-Russell Engineering Corp.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

FIRST AID EQUIPMENT
United Engineers & Constructors, Inc.

FITTINGS
S R Dresser Mfg. Co.
Isbell-Porter Company.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
U S. Cast Iron Pipe and Foundry Co.
The Western Gas Construction Company.
Plain End and Flanged
Cast Iron Pipe Research Association.

FIXTURES
American Lava Corp.

FLOORS, IRON, BRICK, AND STEEL
The Gas Machinery Co.
McClintoc Marshall Co.
Semet-Solvay Engineering Corp.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

FLOW METERS
American Meter Co.
Brown Instrument Co., The
Lambert Meter Co.

FLUE PIPE (Cast Iron Oval)
Semet-Solvay Engineering Corp.

FURNACES
Gas Fired
Geo. D. Roper Corp.
Gas Soldering
American Meter Co.

GAS ANALYSIS APPARATUS
American Meter Co.
Metric Metal Works.

GASKETS
American Meter Co.
Pittsburgh Equitable Meter Co.
Reynold Gas Regulator Co.
Superior Meter Co.

GAS COAL
Boone County Coal Corpn.

GAS MAIN CONDUITS
Armco Culvert Manufacturers Assn.

GASOMETERS (Test)
American Meter Co.

GAS PLANTS, COMPLETE
Gas Engineering Co.
Improved Equipment-Russell Engineering Corpn.
Isbell-Porter Company.
Philfuels Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Co.

GAS SCREEN
Connelly Iron Sponge & Governor Co.

GASSING MACHINE
American Meter Co.
Lambert Meter Co.
Superior Meter Co.

GAS TAPE
Connelly Iron Sponge & Governor Co.

GAS TESTING APPARATUS
American Meter Co.
Metric Metal Works.

GATE VALVES (See Valves)

GATES—WIND & BLAST
The P. H. & F. M. Roots Company.
The Western Gas Construction Co.

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The Bristol Company.
Brown Instrument Co., The
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Lambert Meter Co.
United Engineers & Constructors Inc.
The Western Gas Construction Company.

GAUGES
American Meter Co.
The Bristol Company.
Brown Instrument Co., The
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
The P. H. & F. M. Roots Company.
Superior Meter Co.
The Western Gas Construction Company.
Mercury
Precision Thermometer & Instrument Company.
Pressure-Recording
American Meter Co.
Brown Instrument Co.
Precision Thermometer & Instrument Company.
Siphon
Precision Thermometer & Instrument Company.
Tank
Brown Instrument Co.
Precision Thermometer & Instrument Company.
Water
Precision Thermometer & Instrument Company.

ACETYLENE, WELDING
Oxweld Acetylene Co.

GLOVES
Rubber
Safety Gas Main Stopper Co.

GOVERNORS
Pittsburgh Equitable Meter Co.
Automatic
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.

GOVERNORS (Calorimeter and Double Dry)
American Meter Co.
Reynolds Gas Regulator Co.
Coke Oven
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
District
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Isbell-Porter Co.
Smoot Engineering Corp.
Exhauster
Connelly Iron Sponge & Governor Co.
Connersville Blower Co., The
The Gas Machinery Co.
Isbell-Porter Co.
The P. H. & F. M. Roots Company.
Smoot Engineering Corp.
High Pressure
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.
Laboratory
American Meter Co.
Connelly Iron Sponge & Governor Co.
Lambert Meter Co.
D. McDonald & Co.
Reynolds Gas Regulator Co.
Low Pressure
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Lambert Meter Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.
Retort House
Isbell-Porter Company.
Station

GRATES for Water Gas Generators
Semet-Solvay Engineering Corp
The Western Gas Construction Co.

GRAVITOMETERS
Precision Thermometer & Instrument Company.

GRIDS, for Scrubbers
Semet-Solvay Engineering Corp.
The Western Gas Construction Co.

GUN-REFRACTORY
Quigley Furnace Specialties Co.

HEATERS
Feed Water
Andale Company.
For Oil
Andale Co.
American Gas Products Corp.
American Stove Company.
Homestead Heater Company
Komnak Company.
Roberts-Gordon Appliance Corpn.
Welsbach Company.

HIGH CAPACITY METERS
Lambert Meter Co.

HOISTS
The Gas Machinery Co.
C. W. Hunt Co., Inc
The Western Gas Construction Co.

HOLDERS
Bartlett-Hayward Co.
Cruse-Kemper Co.
Gas Engineering Co.
McClintoc Marshall Co.
Stacey Bros. Gas Const Co
The Stacey Mfg. Co
The Western Gas Construction Co.

HOPPERS—COAL AND COKE
Bartlett-Hayward Co.
Cruse-Kemper Co.
C. W. Hunt Co., Inc
McClintoc Marshall Co.
The Stacey Mfg. Co.
The Western Gas Construction Co.

HIGH PRESSURE STORAGE
Cruse Kemper Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.

HOWARD AUTOMATIC CHARGERS
The Western Gas Construction Company.

HYDROGEN GAS APPARATUS
Bartlett-Hayward Co.
Cruse Kemper Co.
Gas Engineering Co.
Improved Equipment-Russell Engineering Corp.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
United Engineers & Constructors. Inc.
The Western Gas Construction Co.

HYDROGEN SULPHITE TEST (Apparatus)
American Meter Co.

HYDROMETERS
The Brown Instrument Co.
Precision Thermometer & Instrument Company.

INCINERATORS, GAS-FIRED
Kernit Incinerator Co.

INDUSTRIAL GAS MIXERS
The C. M. Kemp Mfg. Co
Roberts-Gordon Appliance Co.
Smoot Engineering Corp.

INDUSTRIAL TRACK
C. W. Hunt Co., Inc.

IRON BORING OXIDE
Gas Purifying Materials Co., Inc

IRON SPONGE
Connelly Iron Sponge & Governor Co.

INSTRUMENTS
Alpha-Lux Company
American Meter Co.
The Bristol Company.
Brown Instrument Co., The
Lambert Meter Co.
Metric Metal Works.
Precision Thermometer & Instrument Company.

INSULATION
Insulating Cements
Refractory & Engineering Corpn.

PACKING FIBRE
Refractory & Engineering Corpn

PENTANE
Philfuels Co.

PROPANE
Philfuels Co.

JOINTS (Pipe)
S. R. Dresser Mfg. Co.
Southwestern Pipe Joint & Eng. Co.
United States Pipe & Foundry Co.
Insulating
United Engineers & Constructors Inc.
Victaulic Co. of Amer.

JOINT RUNNERS
Safety Gas Main Stopper Co.

LAUNDRY STOVES
Geo. D. Roper Corp.

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Intensely Active. High Total Sulphur Absorption at Minimum Cost.

"THE EFFICIENT PURIFIER"

The Sponge with the large Tough Shavings Always Uniform

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NEW YORK CHICAGO PITTSBURGH

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Engineers and Contractors for Complete Gas Works

I-P Co.

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Tanks, Barges, Pipe, Transmission Towers

and Plate Work

General Offices:- PITTSBURGH, PA.

OFFICES IN PRINCIPAL CITIES

Buyers' Reference Index

See page 123 for advertisements of these products

LAVA BURNER GRIDS
American Lava Corp.
LAVA PILOT TIPS
American Lava Corp.
LINING—REFRACTORY
(See Refractory Linings
LINE PIPE
Electric Weld-Steel.
LIQUEFIED PETROLEUM GASES
Philfuels Co.
LUGS—SOLDERING
Wolverine Tube Company.
LUX MATERIAL
Alpha-Lux Company.
LUX SPONGE
Alpha-Lux Company.
MANILA AND WIRE ROPE
C. W. Hunt Co., Inc.
MANOMETERS
American Meter Co.
Brown Instrument Co., The
Precision Thermometer & Instrument Company.
MANTLES
Welsbach Company.
MASKS—GAS
Safety Gas Main Stopper Co.
MAST & GAFF OUTFITS
C. W. Hunt Co., Inc.
MEASURING CHUTES
C. W. Hunt Co., Inc.
MECHANICAL GENERATORS
for Water Gas App.
United Engineers & Constructors, Inc.
The Western Gas Construction Co.
METER CONNECTIONS
American Meter Co.
Bartlett-Hayward Co.
S. R. Dresser Mfg. Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
Superior Meter Co.
METER REPAIRING
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
METER TESTER, Hydro-Pneumatic
American Meter Co.
METERS
American Meter Co.
Brown Instrument Co., The
Pittsburgh Equitable Meter Co.
Air
Brown Instrument Co.
Connersville Blower Co., The
The Gas Machinery Co.
Lambert Meter Co.
The P. H. & F. M. Roots Company.
The Sprague Meter Co.
Superior Meter Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.
Artificial
American Meter Co.
Connersville Blower Co., The
Lambert Meter Co.
The P. H. & F. M. Roots Company.
The Sprague Meter Co.
Superior Meter Co.
Demand
American Meter Co.
Brown Instrument Co.
Connersville Blower Co., The
Lambert Meter Co.
The P. H. & F. M. Roots Company.
Superior Meter Co.
Demonstration
District
American Meter Co.
Connersville Blower Co.
Dry
American Meter Co.
Connersville Blower Co.
Lambert Meter Co.
The P. H. & F. M. Roots Company.
The Sprague Meter Co.
Superior Meter Co.
Exhibition
American Meter Co.
High Pressure
Natural Gas
American Meter Co
Brown Instrument Co.
Connersville Blower Co., The
Lambert Meter Co.
The P. H. & F. M. Roots Company.
The Sprague Meter Co.
Superior Meter Co.
Oil
American Meter Co.
Brown Instrument Co.
Connersville Blower Co., The
The Gas Machinery Co.
Orifice
American Meter Co.
Positive
The Sprague Meter Co.
Prepayment
American Meter Co.
The Sprague Meter Co.
Superior Meter Co.
Proportional
The P. H. & F. M. Roots Company.
Rotary Displacement
Station
Connersville Blower Co.
American Meter Co.
Brown Instrument Co.
Connersville Blower Co., The
The P. H. & F. M. Roots Company.
The Western Gas Construction Company.
Steam
American Meter Co.
The Gas Machinery Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company
Test
American Meter Co.
The Sprague Meter Co.
Superior Meter Co.
Wet Test
American Meter Co.
METER LEATHER
American Meter Co.
Besse, Osborn and Odell, Inc.
MILLER GRIP PACKING
Connelly Iron Sponge & Governor Co.
MIXERS, GAS
Robert-Gordon Appliance Corpn.
Semet-Solvay Engineering Corp.
Smoot Engineering Corp.
MOISTURE DETERMINATORS
United Engineers & Constructors Inc.
MOTORS, AIR OR GAS
Connersville Blower Co.
MOTOR CARS
C. W. Hunt Co., Inc.
NAPHTHALENE EXTRACTORS
Bartlett-Hayward Co.
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.
OIL HEATERS
Andale Co.
ORE, CHROME
E. J. Lavino & Co.
General Refractories Co.
Quigley Furnace Specialties Co.
ORIFICE METERS
American Meter Co.
OVENS (BAKERS)
The Bruce McDonald Co.
Geo. D. Roper Corp.
OVENS, COKE AND GAS
Improved Equipment
Russel Engineering Corpn.
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
The Western Gas Costruction Co.
OXIDE
Alpha-Lux Company.
Connelly Iron Sponge & Governor Co.
Gas Purifying Materials Co., Inc.
E. J. Lavino & Co.
OXY-ACETYLENE APPARATUS
Oxweld Acetylene Co.
OXYGEN
Linde Air Products Co.
OXYGEN AND HYDROGEN METERS
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
PACKING
Asbestos
Safety Gas Main Stopper Co.
PAINTS
Cheesman-Elliott Co.
Inertol Co., Inc.
Quigley Furnace Specialties Co.
The Stacey Mfg. Co.
Wailes Dove-Hermiston Corp.
Metal Protective
Semet-Solvay Co.
PAINTS, ANTI ACID AND ALKALI
Cheesman-Elliott Co.
Quigley Furnace Spec. Co., Inc.
PAINTS, RUSTPROOF
Cheesman-Elliott Co.
Inertol Co., Inc.
Quigley Furnace Spec. Co., Inc.
PHOTOMETERS
Connelly Iron Sponge & Governor Co.
PILOTS-SAFETY
Spencer Thermostat Co.
PIPE
Waylow Pipe Co.
Hedges-Walsh-Weidner Co.
National Tube Co.
The Stacey Mfg. Co.
United States Pipe & Foundry Co.
The Western Gas Construction Co.
Bell
American Meter Co.
Semet-Solvay Engineering Corp.
McWane Cast Iron Pipe Co.
Bell and Spigot
U. S. Cast Iron Pipe & Foundry Co.
Cast Iron
Southwestern Pipe Joint & Eng Co.
McWane Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Foundry Co.
Flange
Semet-Solvay Engineering Corp.
U. S. Cast Iron Pipe & Foundry Co.
Screw Joint Cast Iron Pipe
McWane Cast Iron Pipe Co.
Seamless Steel
Spigot
McWane Cast Iron Pipe Co.
Semet-Solvay Engineering Corp.
Steel
Bartlett-Hayward Co.
Cruse-Kemper Co.
The Gas Machinery Co.
National Tube Co.
Pittsburgh Steel Products Co.
Republic Steel Corp.
Semet-Solvay Engineering Corp.
Welded Steel
Bartlett-Hayward Co.
Cruse-Kemper Co.
The Gas Machinery Co.
National Tube Co.
McClintoc Marshall Co.
Semet-Solvay Engineering Corp.
PIPE COATINGS
Quigley Furnace Specialties Co.
Wailes Dove-Hermiston Corp.
PLANTS—GAS, COMPLETE
The Gas Machinery Co.
Improved Equipment-Russell Engineering Corp.
The Koppers Construction Co.
Philfuels Co.
Stacey Bros. Gas Const. Co.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Company
PLATES
Cruse-Kemper Co.
C. W. Hunt Co., Inc.
The Stacey Mfg. Co.
The Western Gas Construction Company.
Floor
Gas Engineering Co.
The Gas Machinery Co.
McClintoc Marshall Co.
The Stacey Bros. Gas Construction Co.
United Engineers & Constructors, Inc.
PLUGS, SERVICE AND MAIN
Rubber
Safety Gas Main Stopper Co.
Soft Wood
Safety Gas Main Stopper Co.
PORTABLE TEST METERS
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
PRODUCER GAS PLANT
Gas Engineering Co.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.
PRODUCER GAS STEAM
American Meter Co.
PROVERS—Critical Flow for H. P. Field Testing
American Meter Co.
PROVERS—METER
American Meter Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
Superior Meter Co.
PUMPS
Drip
American Meter Co.
The Gas Machinery Co.
Lambert Meter Co.
D. McDonald & Co.
Geo. D. Roper Corp.
Gas
Connersville Blower Co..
The P. H. & F. M. Roots Company.
Geo. D. Roper Corp.
Gas Bag
Safety Gas Main Stopper Co.
Hand
American Meter Co.
Lambert Meter Co.
Safety Gas Main Stopper Co.
Oil
Connersville Blower Co., The
The Gas Machinery Co.
The P. H. & F. M. Roots Company.
Power
Connersville Blower Co., The
The P. H. & F. M. Roots Company.
Geo. D. Roper Corp.
Pressure
Connersville Blower Co., The
The P. H. & F. M. Roots Company.
Service
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
Service Cleaner
American Meter Co.
Lambert Meter Co.
Safety Gas Main Stopper Co.
Superior Meter Co.
Tar
Connersville Blower Co., The
The P. H. & F. M. Roots Company.
Geo. D. Roper Corpn.
Water
Connersville Blower Co., The
The P. H. & F. M. Roots Company.
Vacuum
American Meter Co.
Connersville Blower Co., The
Geo. D. Roper Corpn.
The P. H. & F. M. Roots Company.
PURIFIERS
Bartlett-Hayward Co.
Cruse-Kemper Co.
Gas Engineering Co.
The Gas Machinery Co.
Isbell-Porter Company.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
Stacey Bros. Gas. Const. Co.
The Stacey Mfg. Co.
Riter-Conley Company.
United Engineers & Constructors Inc.
The Western Gas Construction Company
PURIFYING MATERIALS
Alpha-Lux Company.
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Gas Purifying Materials Co., Inc
The Koppers Construction Co.
E. J. Lavino & Co.
PURIFIER TRAYS
Bartlett-Hayward Co.
Connelly Iron Sponge & Governor Co.
Cruse-Kemper Co.
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
Stacey Bros. Gas Const. Co.
The Stacey Mfg. Co.
United Engineers & Constructors

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CONSTANT, uniform motion, combined with proper heat distribution, assures a thorough and even bake, for all baking operations. Eight distinctive advantages make McDonald-made, Meek Reel Ovens the choice of thousands of bakers all over the world for the past quarter of a century. Meek Ovens, too, are standard equipment in the packing industry for the baking of meat loaves. Let us solve your baking problems. Complete information on request.

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GOODMAN GAS MAIN STOPPER — Used since 1897 — Improved Locking Sleeve

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Goodman Stoppers
Goodman Cylindrical Stoppers
Gas Main Bags
Canvas-covered Bags
Inflating Bulbs
Pumps
Respirators
Krupa-Hendry Test Cap
Pressure Gauges,— portable and stationary
Gas Sampling Bags
Service Cleaners
Service Testers
Joint Runners
Calking Tools
Mittens and Gloves
Rubber Boots
Service Plugs, Rubber
Gas Main Plugs
Soft Wood Plugs
Pipe Cleaning Brushes
Soap Tape
Air-Line Masks
Packings

Safety Gas Main Stopper Co.
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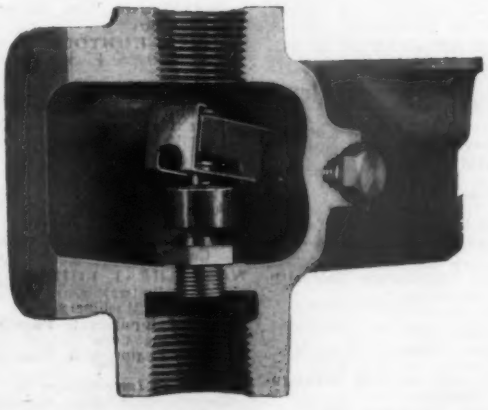
GROBLE REGULATORS & GOVERNORS



Accessible and Removable Valve

while the regulator is connected in the service line, is an outstanding feature contained in Groble Service Regulators.

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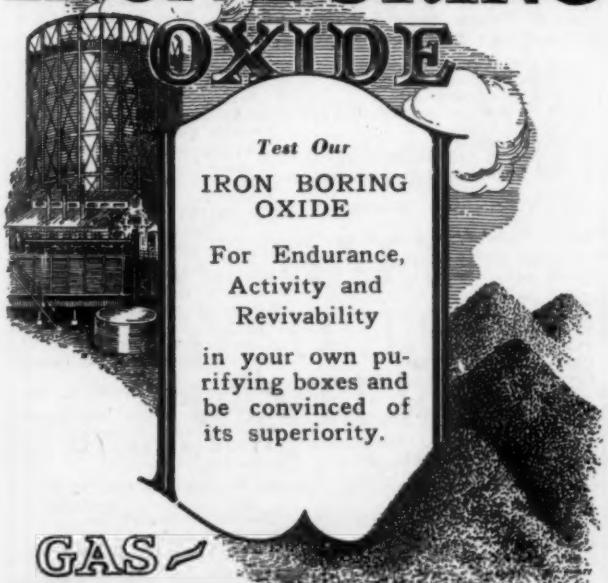

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IRON BORING OXIDE
For Endurance, Activity and Revivability
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GAS PURIFYING MATERIALS COMPANY INC.

FOOT OF HALSEY STREET · · · · LONG ISLAND CITY · NEW YORK ·
BRANCH YARD—PROVIDENCE, R. I.

Buyers' Reference Index

See page 123 for adverisements of these products

The Western Gas Construction Company.

PYROMETERS
The Brown Instrument Co.
The Bristol Company.
The Western Gas Construction Company.
Indicating
The Brown Instrument Co.
The Gas Machinery Co.
United Engineers & Constructors Inc.
Recording
The Brown Instrument Co.
The Gas Machinery Co.
United Engineers & Constructors Inc.

RADIATORS
Gas Steam
American Gas Products Corp.

RADIATORS—VERTICAL FIN
Wolverine Tube Co.

RANGES—GAS
American Stove Co.
Geo. D. Roper Corpn.
Standard Gas Equipment Corp.

RANGES (HOTEL AND RESTAURANT)
Geo. D. Roper Corpn.
Standard Gas Equipment Corp.

RECORDERS—LIQUID LEVEL
The Bristol Co.
The Brown Instrument Co.

RECORDING DEMAND METERS
American Meter Co.
The Brown Instrument Co.
Lambert Meter Co.

REFRACTORY CEMENTS
The Gas Machinery Co.
General Refractories Co.
Improved Equipment—Russell Engineering Corp.
E. J. Lavino & Co.
Quigley Furnace Spec. Co. Inc.
Refractory & Engineering Corp.
United States Refractories Corp.

REFRACTORY GUN
Quigley Furnace Spec. Co. Inc.

REFRACTORY LININGS
Alpha-Lux Company
The Gas Machinery Co.
General Refractories Co.
Improved Equipment—Russell Engineering Corp.
Quigley Furnace Spec. Co. Inc.
Refractory & Engineering Corp.
United Engineers & Constructors, Inc.
The Western Gas Construction Company
United States Refractories Corp.

REFRIGERATORS—GAS
Servel Sales, Inc.

REGULATORS
American Meter Co.
The Brown Instrument Co.
The Chaplin Fulton Mfg. Co.
Connersville Co., The
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Isbell-Porter Co.
Pittsburgh Equitable Meter Co
Reynolds Gas Regulator Co.
Robertshaw Thermostat Co.
Smoot Engineering Corp.
The Sprague Meter Co.
Air Pressure
Brown Instrument Co.
Smoot Engineering Corp.
Coke Oven Suction Main
Smoot Engineering Corp.
Exhauster
Brown Instrument Co.
Connersville Blower Co.
Smoot Engineering Corp.
Furnace Pressure
Smoot Engineering Corp.
Oven
American Stove Co.
Pressure
Connersville Blower Co.
Steam Pressure
Smoot Engineering Corp.
The Brown Instrument Co.
Suction
Connersville Blower Co.

REPAIR PARTS
American Meter Co.
Lambert Meter Co.

RESPIRATORS
Connelly Iron Sponge & Governor Co.
Safety Gas Main Stopper Co.

RETORTS
Horizontal and Inclined
Improved Equipment—Russell Engineering Corp.
Vertical
United Engineers & Constructors Inc.
West Gas Improvement Co.
Silica and Clay
Improved Equipment—Russell Engineering Corp.
The Gas Machinery Company
United States Refractories Corp.

RETORT CEMENT
Alpha-Lux Company
General Refractories Co.
The Gas Machinery Co.
Improved Equipment—Russell Engineer Corp.
Quigley Furnace Spec. Co. Inc
United States Refractories Corp.

REVERSE FLOW GOVERNORS
Connelly Iron Sponge & Governor Co.
Reynold Gas Regulator Co.

SAFETY VALVES
Chaplain Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Reynolds Gas Regulator Co.
Spencer Thermostat Co.

SCREENS, ELECTRIC VIBRATING
C. W. Hunt Co. Inc.

SCRUBBERS
Bartlett Hayward Co.
Cruse-Kemper Company
Gas Engineering Co.
The Gas Machinery Co.
Isbell-Porter Co.
Semet-Solvay Engineering Corp.
Stacey Bros. Gas Const. Co.
The Stacey Mfg. Co.
West Gas Improvement Co.
The Western Gas Construction Company.

SEAL, DEAD WEIGHT
Reynolds Gas Regulator Co.
Spencer Thermostat Co.

SERVICE BOXES
The Stacey Mfg. Co.

SERVICE CLEANERS
American Meter Co.
Safety Gas Main Stopper Co.
Superior Meter Co.

SERVICE PLUG-RUBBER
Connelly Iron Sponge & Governor Co.
Safety Gas Main Stopper Co.

SKIP HOIST
C. W. Hunt Co. Inc.

SPECIFIC GRAVITY APPARATUS
American Meter Co.

SPECIFIC GRAVITY GAUGES
Alpha-Lux Company.

SPONGE
Alpha-Lux Company
Connelly Iron Sponge & Governor Co.
Gas Purifying Materials Co. Inc.

SPRAYS, for Water Gas Machines
Semet-Solvay Engineering Corp.

STATION METERS (See Meters Station)

STEAM ACCUMULATORS
(See Accumulators—Steam)
The Gas Machinery Co.
Smoot Engineering Corp.
United Engineers & Constructors Inc.
The Western Gas Construction Company

STOPPERS
Safety Gas Main Stopper Co.

STRAINERS—GAS, STEAM, WATER, OIL
Andale Company.

STREET DEPT. EQUIPMENT
American Meter Co.
Connelly Iron Sponge & Governor Co.
Safety Gas Main Stopper Co.

STREET LAMPS
Welsbach Street Lighting Co.

SULPHUR AND AMMONIA TEST (Apparatus)
American Meter Co.

SYSTEMS
Combustion Control
Smoot Engineering Corp.

TACHOMETERS
Brown Instrument Co., The
The Bristol Company.
Precision Thermometer & Instrument Company

TAMPERS AND BACKFILLERS
The Cleveland Trencher Co.

TANK REGULATORS
Chaplin Fulton Mfg. Co.
Reynolds Gas Regulator Co.

TANKS
Bartlett-Hayward Co.
Cruse-Kemper Company.
Gas Engineering Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
The Stacey Bros. Gas Construction Co.
The Western Gas Construction Company.
Gas, Oil, Storage
Stacey Bros. Gas Const. Co.
The Stacey Mfg. Co.
High Pressure
The Gas Machinery Co.
McClintoc Marshall Co.
Stacey Bros. Gas Const. Co.
The Stacey Mfg. Co.

TANKS, ACETYLENE GAS
The Prest-O-Liite Co., Inc.

TAPE SOAP—BINDING
Safety Gas Main Stopper Co.

TAR DISTILLING PLANTS
Gas Engineering Co.
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
West Gas Improvement Co.

TAR DISPLACEMENT SYSTEM
The Gas Machinery Co.

TAR EXTRACTORS
Bartlett-Hayward Co.
Gas Engineering Co.
The Gas Machinery Co.
Isbell-Porter Co.
Research Corpn.
Semet-Solvay Engineering Corp.
West Gas Improvement Co.
The Western Gas Construction Company.
United Engineers & Constructors, Inc.

TEMPERATURE CONTROLING DEVICE—Oven
American Stove Co.
The Bristol Company.
Brown Instrument Co., The
Robertshaw Thermostat Co.

TESTING APPARATUS, GAS
American Meter Co.
Pittsburgh Equitable Meter Co.
Precision Thermometer & Instrument Company

THERMOCOUPLER
The Brown Instrument Co.

THERMOMETERS
American Meter Co.
The Bristol Company.
Brown Instrument Co., The
Lambert Meter Co.

THERMOCOUPLE TUBES
The Brown Instrument Co.
Precision Thermometer & Instrument Company.
Superior Meter Co.

THERMOSTATS
The Bristol Company
Brown Instrument Co., The
Precision Thermometer & Instrument Company
Robertshaw Thermostat Co.
Spencer Thermostat Co.

THERMOSTATIC METAL
W. H. Chace Valve Co.

TOASTERS
American Gas Products Corp.

TOOLS
Semet-Solvay Engineering Corp.

TORCHES—WELDING AND CUTTING
Oxweld Acetylene Co.
Union Carbide & Carbon Co.

TRENCH DIGGERS
The Cleveland Trencher Co.

TUBES, BOILER
National Tube Co.
Pittsburgh Steel Products Co.

TUBES
Seamless Steel
National Tube Co.
Pittsburgh Steel Products Co.

TUBING — (Seamless) ALUMINUM, COPPER, BRASS
Wolverine Tube Co.

U GAUGES
American Meter Co.
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
Precision Thermometer & Instrument Company.
Safety Gas Main Stopper Co.
Superior Meter Co.

UNDERGROUND CONSTRUCTION ACCESSORIES
The Cleveland Trencher Co.

UNIT HEATERS
Wolverine Tube Co.

VACUUM GAUGES
American Meter Co.
The Bristol Company.
Brown Instrument Co., The
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
Precision Thermometer & Instrument Company.

VALVES
Bartlett-Hayward Co.
Chaplin-Fulton Mfg. Co.
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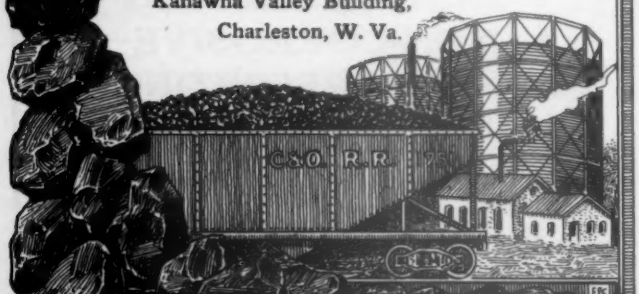

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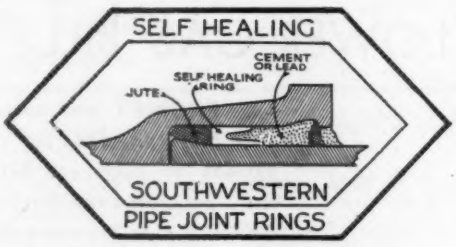

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American Lava Corpn. 119
American Meter Co. 13-68
American Stove 105
American Radiator Co. 113
Amherst Logan Coal Corpn. 120
Andale Co. 119
Armco Culvert Mfrs. Assn. 102

Barber Gas Burner Co., The 85-119
Bartlett Hayward Co. 32
Besse, Osborne & Odell, Inc. 115
Boone County Coal Corpn. 23-24
Bristol Company, The 18
Brown Instrument Co. 16
Byllesby Engineering & Management Corp. 110

Cast Iron Pipe Research Assn. 31
Chace Valve Co., W. M. 120
Chaplin-Fulton Mfg. Co. 104
Cheesman Elliot Co. 98
Cleveland Gas Meter Co., The 95
Cleveland Trencher Co. 27
Clow & Sons, James B. 26
Columbia Burner Co., The 108
Connelly Iron Sponge & Governor Co. 19
Connersville Blower Co. 11
Cooper Bessemer Corpn. 14
Cruse Kemper Co. 8

Darling Valve & Mfg. Co. 21
Dieterle, Edward A. 121
Dresser, S. R., Mfg. Co. 25

Electrolux Refrigerator Sales, Inc. 101

Franklin Gas Appliance Co., The 121

Gas Engineering Co. 121
Gas Machinery Co. 4
Gas Purifying Materials Co. 117
General Gas Light Co. 89
Groble Gas Regulator Co. 117

Homestead Heater Co. 120
Humphrey Co. 111
Hunt, C. W., Co., Inc. 109

Improved Equipment—Russell Engr. Co. 9
Inertol Co., Inc. 94
Isbell Porter Co. 115

Kernit Incinerator Co. 97
Kompak Company 96
Koppers Construction Co. 2

Lambert Meter Co. 110
Lattner Mfg. Co., P. M. 110
Lavino & Co., E. J. 115
Ludlow Valve Co. 110

McClintic-Marshall Co. 115
McDonald Co., Bruce 117
McWane Cast Iron Pipe Co. 100
Mueller Company 12

National Cast Iron Pipe Co. 26
National Tube Co. 28

Philfuels Company 10
Pittsburgh Equitable Meter Co. 93
Precision Thermometer & Instrument Co. 91

Quigley Furnace Specialties Co. 109

Refractory & Engineering Corp. 20
Reynolds Gas Regulator Co. 22
Robertshaw Thermostat Co. 103
Roots Co., P. H. & F. M. 11
Roper Corpn., Geo. D. 87

Safety Gas Main Stopper Co. 117
Schmidt & Co., L. D. 121
Semet-Solvay Engineering Corp. ..... Front Cover
Smoot Engineering Co. 6
Southwestern Pipe Joint & Eng. Co. 120
Spencer Thermostat Co. 99
Sprague Meter Co. 29
Stacey Bros. Gas Construction Co. 65
Stacey Engineering Co. (Blower Div.) 11
Stacey Manufacturing Co. 5
Standard Gas Equipment Corpn. 120
Superior Meter Co. 91
Surface Combustion Co., The 30

Unger, John S. 121
Union Carbide & Carbon Corp. 15
United Engineers & Constructors, Inc. 7
United States Pipe & Foundry Co. ..... Back Cover

Victaulic Co., of America 17

Wailes, Dove, Hermiston Corp. 125
Welsbach Co. 83
West Gas Improvement Co. 81
Wilbraham-Green Co. 11
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BUYERS REFERENCE INDEX, PAGES 112, 114, 116, 118

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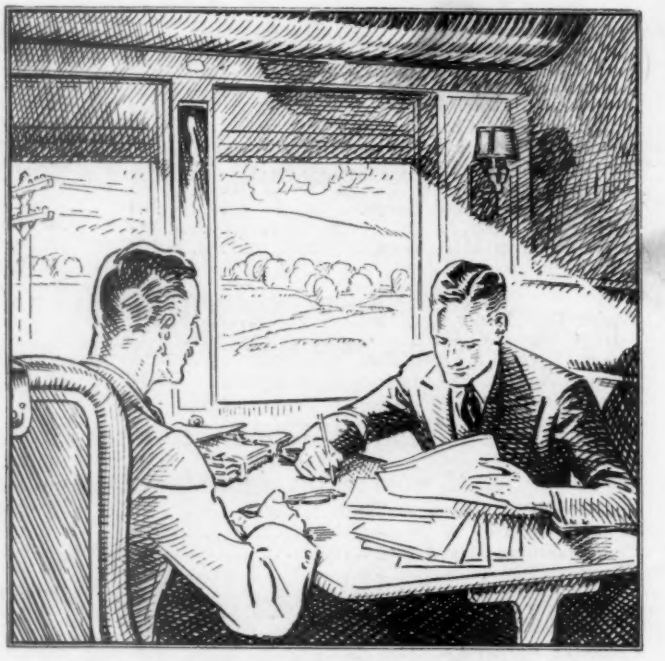

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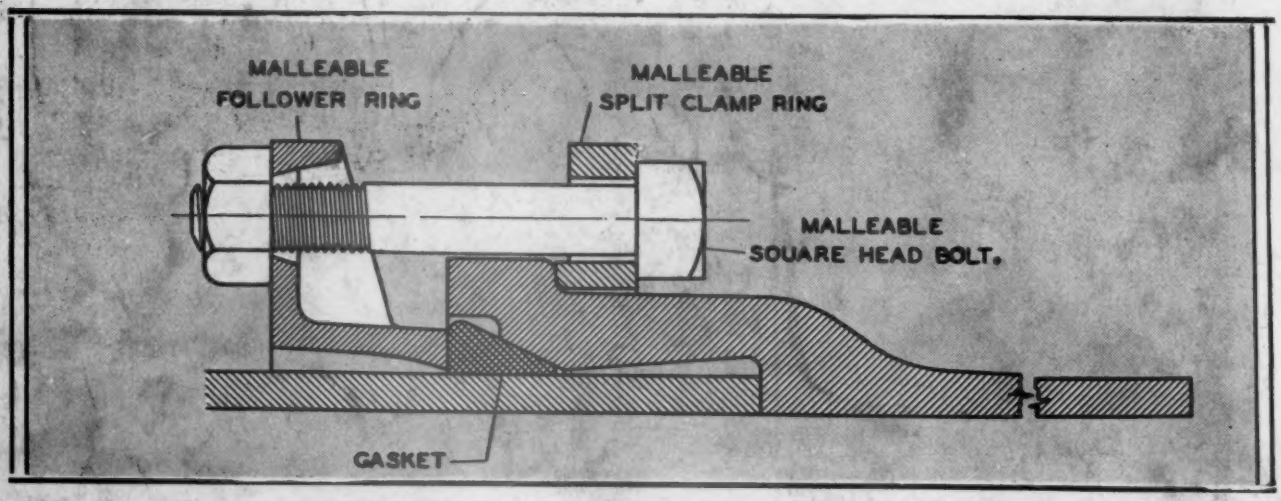

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